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The Subsidence in the Metropolitan Railway Tunnel.

MAJOR-GENERAL HUTCHINSON'S report on the subsidence recently noticed on the Metropolitan Railway is reassuring to the public, both as to the thoroughness of the investigation which it promises, and as to the careful watch that is kept on the spot. In the railway tunnels of this country the importance of keeping down the cost per yard has led to a mode of construction which involves no little risk in the event of any disturbance of the surrounding ground. Few railway works, indeed, are so built as to be in a state of permanent statical equilibrium, apart from the support that they derive from the soil filled in at their backs. When a span is bridged by girders, and the pressure comes vertically on the piers, this remark does not apply. But in every case, probably, where lateral thrust comes into play, the abutments depend for their stability, not on their own weight alone,—as in the case of the flying arches and towering pinnacles of Gothic architects,—but on the support given by the backing, which is actually punned in behind them. And in the tunnel sections, which have generally taken for their type those designed by Mr. Robert Stephenson for the Watford and the Primrose Hill tunnels, this principle of depending on the resistance of the soil to the lateral pressure of the arch has been relied on to the utmost extent.

Mr. Simms, or rather the editor, Mr. D. K. Clark, of the work of the former on "Practical Tunnelling," a standard authority on the subject, speaks of the pressure of clay and shale on the brickwork of tunnels, where the soil has been disturbed by excavation, as something almost immeasurable. The phenomena of disturbance, he remarks, supply powerful examples of the flow of solids. The original designs for the tunnels on the London and North-Western Railway, just referred to, were ellipsoidal sections, struck from three centres (for the half section), and with the bottom formed by an invert of somewhat longer radius than the flattest part of the side of the main arch, or about 22 ft. The thickness of the arch varies in ordinary cases from 1 ft. 10½ in. to 3 ft., the invert generally being less in depth by half a brick than the ring. When the driftway through the Watford Tunnel was completed, the chalk appeared to be generally so firm, hard, and dry, that on the suggestion of the late Sir Charles Fox, then sub-assistant engineer at Watford, Mr. Stephenson substituted footings to the side walls for the invert, with complete success. The same plan was then tried on the tunnel through the London clay of Primrose Hill. It was soon found, however, that this would not do. Although so hard as to require the use of the pick for excavation, this material proved to be in a semi-fluid state. The mortar was squeezed from the beds and joints of the brickwork; the inner arrises of the bricks flushed and chipped; the floor of the tunnel rose, and the walls began to approach to one another at the bottom. In fact, the whole structure was so evidently on the move as to leave no doubt that a non-inverted tunnel would soon be filled up with clay. Hard bricks had to be employed, set in Roman cement, for a thickness of 27 in., and an invert was also built. A similar experience was obtained in the Netherton Tunnel, built in the "blue bind," or marl. In this case, the invert was rebuilt with a smaller radius.

Mr. D. K. Clark remarks, in his additions to the work of Mr. Simms, that for the reason that the surrounding ground has been disturbed and moved in the course of construction of tunnels, through clay, shale, or loose strata, the operation of the enlargement of tunnels is peculiarly hazardous. In comparatively shallow ground,—that is to say, less than 40 ft. below the surface,—the pressure may be localised and concentrated upon the crown of the arch with peculiar severity. In the Stapleton tunnel the arch was at first built with only four rings of brickwork in mortar. When the autumn rains set in, the ground began to press heavily, so that the line of the tunnel could be traced as a hollow on the surface of the ground, which was not more than 40 ft. above the tunnel. A portion of the arch finally fell in, and was rebuilt with five and six rings of brick.

Some idea of the cost involved by such a work as the enlarging of a tunnel may be formed from the experience of the Lindal tunnel on the Furness Railway. This tunnel, three-eighths of a mile in length, was constructed in 1849. It was 14 ft. 6 in. high, and 12 ft. wide in the clear, and cost 6*l.* per yard linear for excavation, and 15*l.* 10s. per yard linear for masonry. In 1854 this tunnel was enlarged, in order to accommodate a double line of way. The additional cost thus incurred was 21*l.* 4s. per linear yard for excavation, and 38*l.* per linear yard for masonry. The original price of 6*l.* per linear yard of excavation was equal to 6s. 2d. per cubic yard, a fair contract price.

This railway experience of thirty years ago coincides very closely with the observations of General Hutchinson as to what has taken place on the Metropolitan Railway in the neighbourhood of Ossulston-street, about a quarter of a mile from the King's-cross Station. For a length of about 120 yards the north wall of the tunnel has been pushed inwards, and has settled, to the extent of from 13 in. to 18 in. vertically. For about 40 yards in length in the middle of this portion, at about one-third of the distance between the soffit and the springing of the arch, a crushing and scaling of the brickwork has occurred for an average width of about 18 in., varying in depth from ½ in. to 3 in. The thickness of the brickwork is not specified by General Hutchinson. Vertical cracks are also observed. It is not difficult to see what has been going on. Some movement, the cause and extent of which it is essential to ascertain, must have taken place in the ground surrounding the tunnel. The brick lining of the latter, not being, it appears, inverted, has had no chance of doing better than to accommodate itself to the changing conditions of pressure. In the change of shape thus effected, that part of the inner ring on which a new pressure was put naturally flushed and flew. A concrete invert is now being put in, which will probably resist any tendency of the footings of the walls to approach one another. There will still remain the question whether the side walls have been so far crushed by the shifting strain as to require replacement, bit by bit, by hard bricks set in cement. No doubt all due precautions will be taken; nor does there appear to be any reason to expect a sudden collapse if a constant watch is kept. But the points of interest to the professional reader are to see how the old difficulties presented by the London clay appear to be reproduced in the present instance; how the economy of omitting the invert has proved, as it did at Primrose Hill, and in the Euston cutting, to be a false economy; and how the use of bricks set in mortar for a structure which forms only a thin shell, balanced and supported by the earth which it keeps from the influence of the air and the damp, is a method of work which leaves but a small margin for the factor of safety.

There are few works of corresponding magnitude which reflect so much credit on their designers and executors as does the Metropolitan Railway. The cost has, no doubt, been enormous. At the end of 1878 it was 639,315*l.* per mile, a rate which has been somewhat reduced by the sale of surplus lands. Purchase of land, of course, swells this enormous price, but in the face of such expenditure, the anxiety of the engineer that not a single cubic foot of brickwork that could be dispensed with should be put into the work, may be understood. The work has stood so well,

—the fall of a portion of the arch near Blackfriars Bridge, in course of construction, will be remembered by our readers,—as to justify the judgment of the engineers hitherto. We will not say that the stability has been more than any one had a right to anticipate. Still, the balance is delicate. The margin of safety is not very wide. And that unsleeping vigilance is demanded, and, no doubt, is exerted, is a very manifest corollary to the report of Major-General Hutchinson.

The Report of Sir Joseph Bazalgette and Mr. J. Wolfe Barry on the subject states that the north wall of the Metropolitan Railway at the point indicated has moved 15 in. laterally and 21 in. downwards, "thus forcing the clay upwards in the centre of the railway." This is, in fact, a repetition of the experience of 1834 as to the Primrose Hill tunnel. The remedy proposed is the formation of a concrete invert, 4 ft. thick, and with a versed sine of 3 ft. As to this, it may be observed that the brick invert of the normal section of the tunnel is 18 in. deep, with the same versed sine of 3 ft. The Report continues that the authors think this a proper remedy, as far as the foundations are concerned, but they "were not aware of the extent of the damage which the arch of the railway might have suffered." This, as we before pointed out, it is imperative at once to ascertain; and it appears to us that it is rather a duty incumbent on the engineers of the line than one to be left by them, as they suggest, to the examiners of the Board of Trade. Meantime, it is recommended that the traffic of the roadway of the Euston-road should be diverted; a precaution which shows the serious nature of the apprehensions entertained by Messrs. Bazalgette and Barry. They proceed,—"After that was done, and the repairs of the tunnel effected, it would take some time for the ground to consolidate." We should like to know on what grounds this remark is made. As far as the general principle of the movement of the London clay is concerned, it is applicable. But the geological section of the Metropolitan Railway shows a bed of 7 ft. thick of the more treacherous yellow clay in the vicinity, which, as it thins out to the east of King's Cross Station, is overlaid by a mixture of clay and gravel. It is clear that any report which deals with the matter as its importance demands must embody a full description of the geological, or, it may be, the accidental and artificial, character of the earth surrounding the damaged portion of the tunnel. Nor can we admit that under a proper handling of the case "further settlements might be expected to take place." We should like to have seen the face of Mr. Robert Stephenson if a report to that effect had been presented to him for approval.

SEWAGE PURIFICATION AT GUILDFORD.

BY FRANCIS R. CONDER, M. INST. C.E.

AS the process of sewage purification to which I have devoted long and careful attention has now reached the stage of practical success in the production of a pure effluent from a notoriously foul sewer at Guildford, I think that the time has come for me to lay before the readers of the *Builder* some of the most important results of this new and powerful method of disinfection.

Of the crying necessity for some better method of sewage disposal than any now in practice it is unnecssary for me to speak at any length. Lord Bramwell's letter of July, 1884, to the Home Secretary, is still applicable to the state of the Thames wherever the thermometer is rising above 60° Fahr. "We went on it at Woolwich Dockyard," said his Lordship. "It was for its whole breadth black sewage, with a stench intolerable." The condition of the river Lea, only less foul than the Thames, was described in the *Builder* of the 12th of September, 1885. The several Reports of the Rivers Pollution Commission tell of the poisoning of our rivers by sewage. And in numerous centres of population the authorities are at their wits' ends between the requirements of the Local Government Board, on the one hand, and the engineering, chemical, and financial difficulties that beset them on the other.

It is obvious, from this state of things, that a sound practical mode of obtaining, at a moderate cost, a way of escape from this terrible source of sanitary danger, as well as of personal nuisance, is hitherto unknown. Not only so, but we can speak as to quantitative result. In the useful work by Messrs. Robinson and Melliss on the purification of water-carried sewage, the various methods in use are described, and analyses are given, chiefly taken from the Reports of the Rivers Pollution Commissioners, of the sewage, the effluent, and the precipitates obtained, by various processes, in twenty-five different cases.

The average amount of solid impurity in these specimens of sewage is 82 grains per gallon, or 5½ grains per gallon less than the average obtained by Messrs. Lawes and Gilbert from 93 analyses of sewage. Of this (omitting fractions), 33 grains were in suspension, and 49 grains in solution. The effluent contained an average of 54 grains, leaving 28 grains of precipitate. Thus the effect of the processes in use, taken as an average, is to remove from the sewage treated 85 per cent. of the matter in suspension, without in any way affecting the matter in solution. Experiment shows that the same result may be obtained by merely allowing sewage to stand for a sufficient time to throw down its own suspended matter.

The annual cost at which this wholly ineffective result is obtained varies, according to circumstances, from 7½d. to 5s. 1½d. per head of population. The fact, however, which has the most controlling influence as to cost is this. In all chemical processes now in use, in order to obtain the imperfect precipitate above stated, from one to 14 tons of foreign matter is added to every million gallons of sewage. The deposit obtained thus contains from double to five or six times as much solid matter as has been precipitated from the sewage. And not only so, but in all cases where lime and clay are used as precipitants the deposit associates with itself water to the amount of some 85 per cent. of the total compound, which is known as sludge.

Thus at Birmingham, in the year 1884, with an estimated dry weather flow of sewage (treated by the lime process) to the outfall tanks of 15 millions of gallons per day, the sludge deposited in the tanks amounted to 174,946 cubic yards, or 31·28 cubic yards per million gallons. The sewage of Birmingham is unusually foul, containing 7 tons 7 cwt. of solid impurity per million gallons. Of this, 3 tons 15 cwt. is in suspension, and is precipitated by the lime or filtered out by subsequent passage over land. The result of an extension of the sewage used for filtration has not been given by the recent historian of the Birmingham Corporation, Mr. Bunce. "The effluent," Mr. Melliss says (writing in 1879), "is simply clarified sewage." The sludge amounts to more than eight times the bulk of the solid matter precipitated from the sewage by the lime.

At Coventry, where the sulphate of alumina process is applied to a sewage containing 3 tons 15 cwt. of solid impurity per million gallons, less than a ton of the same is removed from the effluent. But the resulting sludge is 12½ tons per million gallons, containing 85 per cent. of moisture. This is more than thirteen times the bulk of matter removed from the sewage.

In London it is proposed to boat away the sludge that will be formed from the application of the precipitating process now in contemplation. The strength of the sewage of London has been estimated at some twenty per cent. under that of Birmingham. The volume is upwards of 140 million gallons per day. The resulting sludge, if produced in the same proportion as at Birmingham, would be 1,275,000 cubic yards per annum, and if in the same proportion as at Coventry, half as much more.

In all precipitating processes hitherto brought into use, therefore, the putrescible matter held in solution in the sewage is untouched; the precipitate contains a proportionate amount of putrescible matter, and the bulk of the latter is so increased by the process adopted as to be from eight to thirteen times that of the solids removed from the effluent. Purification is not obtained; and the Local Government Board, as at present advised, hold that a filtration through land is a necessary adjunct to any process of precipitation. In the case of Edmonton, however, the waters of the River Lea are visibly fouled by an effluent which has been thus doubly treated.

The application of iron to the purification of water is not new. In the *Builder* of May 16th, 1885, and of September 5th, 1885; in the Report of the Conference on Water Supply held at the International Health Exhibition, in July, 1884; and in Volumes 72 and 81 of the Minutes of Proceedings of the Institution of Civil Engineers, will be found some account of the history of the application of iron for this purpose. The use of the persalts of iron was recommended by Messrs. Hofman and Frankland, and by the Royal Commissioners in the Second Report (of 1861). Perchloride of iron is now used in France as a disinfectant, and the great cost of the material is the chief obstacle to its employment. Sulphate of iron has been applied, together with other ingredients, in several processes, with a uniformly disastrous effect when lime is present. Its disinfecting action is well known to chemists; as is also the practical difficulty which has prevented its general use. "Chemists," said Mr. Bischof at the Institution of Civil Engineers on January 16th, 1883 (Proceedings, vol. lxxii., p. 67), "could not deal with ferrous compounds; they were by far too rapidly organised." "He could not say what it was that acted in spongy iron. It was difficult to tell how a seed put into the ground germinated. It must, however, be accepted as a fact."

Sulphate of iron has never hitherto been systematically applied to the disinfection of water-carried sewage, under conditions that render possible the great energy of the compound. This is not mere matter of negative evidence. Dr. Thresh, whose application of a chalybeate spring to the sewage of Buxton was described in the *Builder* of May 16th, 1885, wrote to the *Manchester Guardian* on October 3rd, 1885, to the effect that he had "made a great many experiments with various kinds of sewage before and after treatment with ferrous sulphate and other chemicals. . . . . In no single instance was the result satisfactory. . . . Chemists who have given attention to this matter will be utterly at a loss to account for the remarkable results said to have been obtained by Mr. Conder by the use of ferrous sulphate." There is thus irrefutable scientific evidence as to the novelty of the process successfully employed at Guildford.

It is unnecessary here to go step by step through the long process, first of examination of the literature of the subject, and of the records of the Patent Office; second, of private experiment on various kinds of sewage and other polluted waters; and thirdly, of quantitive analysis by a trained and well-known chemist, which preceded the practical application of the process to a notoriously foul sewer at Guildford in November, 1885. Samples of the water of the river Wey, and of the sewage poured into it, were taken from time to time, and submitted to analysis. The first sample of effluent sewage taken contained the frightful amount of 1,014 parts of solid matter in solution, and 112,843 parts in suspension, per million, or 11·3 per cent. of the fluid. The spot selected for the practical treatment was only about 200 yards from the outfall into the Wey of the St. Nicholas Sewer, which carries off the sewage of some 200 persons. A small tank was provided and fixed by the Borough Surveyor, Mr. Henry Peak, and connected with two pipes; the one admitting, through a bib cock, water from the Town Waterworks, the other running from the tank into the sewer. At 2·40 p.m. on the 18th of November this tank was charged with 5 lb. 2 oz. of disinfectant, 5 lb. of which was sulphate of iron. The water was turned on at the rate of one quart per minute, equal to fifteen gallons per hour, at which rate of flow the 5 lb. of sulphate was dissolved in twenty-

four hours, being, in round numbers, at the rate of 25 grains per minute, or 1,500 grains per hour. The flow of the sewer is extremely irregular, varying from almost nothing to sixty gallons per minute, the latter volume being in great part due to the waste-water of a large brewery.

It was anticipated that several days at least would elapse before so small a quantity of iron, which was that proper, according to my calculations, to disinfect the sewage of 185 persons, would produce any sensible effect on so foul a sewer. It was thus only as a matter of precaution that I ordered samples of the effluent to be taken that night and on the following morning. And I confess to being as agreeably surprised as was the Borough Surveyor, Mr. Peak, to find that the very first sample, which had been taken at 5·45 p.m. on the 18th, was not only sweet, but clear and bright, and that the effluent from the mouth of the sewer was the same,—the smell having entirely ceased.

At the next meeting of the Urban Sanitary Authority the Surveyor reported (as is stated in the *Surrey Advertiser* of 12th December) as follows:—"In accordanee with your instructions I have conferred with Mr. Conder M. Inst. C.E., as to his proposal for the purification of the sewers, and have, with him, carried out some inexpensive experiments, with a view to put the system to a practical and useful test. I do not now propose to enter into the details of what has been done, as the matter originally came before the General Purposes Committee, but, as the results appear to be so satisfactory, I think the subject is worthy a further and early consideration; and if the Committee will be good enough to meet again when convenient a report shall be laid before them."

As to the chemical action set up by the process, it may be enough here to state that the chemist I have consulted in the matter is Mr. G. M. Taylor, C.E., F.C.S., of the firm of John Taylor & Sons, of 27, Great George-street. No members of the profession have more experience and authority, with regard to the purification of water, and the securing the water supply of London from sewage pollution, than the engineers of the New River and the Lambeth Waterworks. The action of the iron as applied in my process is described by the analyst to be that of splitting up the putrescible matter in the sewage into its elements, and rendering it innoxious. Mr. Taylor says, "The putrescent character of both precipitate and effluent is entirely removed, and all germs are destroyed by the iron, as far as microscopic analysis has yet been carried." I have mentioned the average quantitative results of twenty-five cases of treatment of sewage. In the case of a very strong domestic sewage, analysed by Mr. Taylor before and after treatment by my process, 63 grains of solid impurities were at first held in solution, and 9·40 grains in suspension per gallon. The whole of the suspended matter, and 28 per cent. of the matter in solution, were removed from the effluent by the treatment. The weight of the putrescible matter resolved, and escaping as non-combustible gas, is a little more than that of the chemicals added. Thus there is no sludge. The deposit obtained is in the form of a fine sinter, which is readily swept away by a gentle current, and contains only the solid matter precipitated from the sewage. The quantity of deposit is, therefore, only from one-eighth to one-thirteenth that obtained, from sewage of equal strength, by any sludge-forming treatment. The cost of the chemical treatment of the St. Nicholas sewer is about 2½d. per day. The allowance of sulphate of iron that has been found ample as a general rule, is at the rate of 10 lb. avoirdupois per individual per annum.

Association of Municipal and Sanitary Engineers and Surveyors.—The Council of this Association give notice of their intention to hold voluntary examinations with the view of granting certificates of competency to candidates for the appointments of Borough Surveyors and Surveyors to Local Boards and other Sanitary Authorities. Particulars of these examinations will shortly be published.

PAST AND PRESENT: A REVERIE IN WELLS CATHEDRAL.

"Pan is dead. Great Pan is dead.
Pan, Pan, is dead."

TO enter one of our English cathedrals is to feel that the spirit that gave them their form is fled. "Pan is dead." The bulk of Englishmen conceive that they are to be saved by other means than incense, celebration of mass, and brilliant processions. Their souls find eternal repose without the aid of prayers daily offered long after their bodies have mingled with the dust of the enclosing coffins. In a word, Englishmen are Protestants; our cathedrals are Roman Catholic.

Stand before the west front of Wells Cathedral, and carry the eye from tier to tier of that wonderful storehouse of sculpture: each one of that great host of figures had its meaning once, and carried its lesson; now, not only is the lesson never learned, and the meaning never mastered, but the very identity of many of the figures is as irretrievably lost as the arms of the Venus de Milo: their only, their abiding value is as works of sculpture: as mere arrangements of drapery and examples of posing, admirably in keeping with the architectural framework in which they appear. They belong to an era in which sculpture was the lowly handmaiden of architecture. The stiff limbs had not yet relaxed, the frozen muscles had not yet thawed beneath the genial breath of the Renaissance. In formal rows they adorn the vast front, stark and stony. They raise the hand, they lean on a lifted knee, they cling to scanty thrones, they gaze with grave eyes across the little city, and whisper in a silent unanimous chorus, "We are Architecture." Not for some centuries were the prophets and sages of Scripture to descend from their pedestals, and pose on their own account as independent works of art, in company with the long array of heathen gods and goddesses. Here at Wells, a dignified band of saints and sages, they are content, with rigid lines, to serve as architecture only. Their names, their deeds, the very reasons of their selection have perished. One tier of sculpture, it is true, is recognised as illustrating events from the Bible, the great connecting link between the religious life of that day and our own. Another pourtrays scenes of the general Resurrection. A third group is said to represent the "nine orders of the celestial hierarchy." Surely here is a symptom of death. What is the celestial hierarchy to the modern Englishman? and how many of us know what number of orders it embraced? At the time it was carved on the west front at Wells, the celestial hierarchy was a power over the souls of men, but now—Pan is dead.

Let us go round and enter through the north porch. In the capitals of the shafts to the outer doorway is some strange carving, which seems to set forth the legend of St. Edmund, King and Martyr. Legend, we say, and why not history? It *was* history when it was carved; and history as firmly believed as the creation of woman from man's rib, or the miraculous gift of tongues. The legend is briefly this. Edmund, king of East Anglia, being made prisoner by invading Danes, was tied to a tree and shot to death with arrows. His slayers then cut his head from the body and threw it into a thick wood. Presently came his friends and followers, to find the headless body of their king bristling with arrows, "like a porcupine." For a long time they searched for the beloved head, but in vain; at last, attracted by cries of "Here! here! here!" they found it protected by a wolf, who delivered it up, and then mournfully retreated into the thicket. In the carving of the shafts to the north porch at Wells may be seen the king pierced with arrows, six from each side; the inhuman Danes with their bows; and a man taking the head from the paws of the pious wolf. The legend further relates how the head, being restored to its normal position with regard to the trunk, grew there again, so that the severance could only be detected by a thin scarlet line. On this piece of history, confirmed by the possession of the martyr's body (presumably with its scarlet line), was built the enormous abbey at St. Edmundsbury,—a substantial witness to the truth of the legend. Yet who now thinks of St. Edmund as anything but a picturesque character in early history, convenient for the pointing of a moral or adorning of a tale? Indeed Pan is dead.

The nave at Wells is a curious piece of work. The clustered columns of the arcade are as beautiful as anything can be; but the clearstory falls so far short in general design as to make one wonder whether it were not chance which produced the beautiful effects of those early days. In this clearstory the architectural lines are heavy and crude,—it is the carving which deserves all the praise. This, indeed, is wonderful. In certain places it lacks definite bounding lines, and the restraint of architectural members; but the vigour of the execution and the fertility of imagination displayed in it are marvellous. Heads are here which run through the whole gamut of human expression. Flowers, transformed into decorative patterns, lose their own characteristics only to gain in crispness of execution. They curl round the end of a label; they issue from monsters' heads to support the vaulting shafts; they veil birds and beasts never met with in modern books of zoology. They sprout and wave, and cling, like the freshest ivy, the brightest grass, the most vigorous columbine; and yet they are flowers, the like of which no botanist, living or dead, ever yet classified. And so, too, the beasts. Here are two, either kissing or biting, with heads as of cats, bodies as of birds, and tails of foliage. Yonder is a monkey with a fool's cap on, sitting, with the body of a bird, on one branch of his own flowering tail, and engaged in biting another. What are we to make of these? Do they represent anything or nothing? Are they the embodiment of fearful conceptions of nature on the part of the carvers, or are they merely a way of rejoicing in vigorous lines and clean curves? Whether they have any particular meaning or not, they speak of a singleness of purpose, a simplicity of mind,—an ignorance, if you will,—that has passed away. Pan is dead.

Near the east end of the nave, and occupying the whole space between two columns on either side, are the two chantries of Bishop Bubwith and Dean Sugar. They are finished with all the delicacy and minute division of parts which mark the Perpendicular style,—the style of careful and painstaking design. The artists have bestowed on them all the refinement of design, the ingenious fancy, and the manual skill, which characterise the work of the fifteenth century. The purpose for which they were built, and which induced so much pains to be taken with them, was simple and godly. It was that in them masses might perpetually be chanted for the repose of the souls of the founders; that day after day, throughout all ages, prayers might ascend in mitigation of the shortcomings of the pious dead. A simple and godly object, but now no longer possible of fulfilment. The times have changed. The dead now die indeed, beyond the help of prayers and masses; their fate has passed away from all human control or intercession; and the chantries which once resounded with the sonorous, perfunctory notes of the priest, now serve as convenient places in which the visitor may enter his name among those of the scores of sightseers who come to the cathedral. It is a perfectly natural result of the march of time. It calls neither for regret nor rejoicing. But when we pass through the narrow doorway to sign our names in the book which stands where once a sacred altar stood; when we gaze up to the traceried vaulting among which the prayers have ceased to echo these centuries,—Pan, Pan is dead.

But now, having entered our names duly, we are free of the whole place, and may wander at will through the privileged aisles of the choir. Here, too, the same lesson is learned. Instead of free access at all hours and to every part we meet with locked doors to everything but the nave. Quite right, if we think awhile on the modern tourist. Instead of a long-skirted priest pacing slowly to the confessional, you are met by a draped verger, who demands sixpence

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towards the repair of the building before you may see the choir. It is quite just that they who come to see should help towards the preservation of what they look at. Once past the jealous gates that guard the choir, all is solitary and deserted. Where are now the altars before which men and women bowed with full hearts? Where are the kneeling forms leaning in wrapt devotion or mechanically counting their beads, or, perhaps, simply enjoying in the dim and solemn coolness a short respite from their daily toil? Not here. Perhaps in some French town you may still see them. You may watch the peasant women come in with their baskets to kneel before their patron saints with a mechanical simplicity that tells of devout faith and faithful devotion. As the daylight fades you may see the attendant lighting candle after candle, each one a tiny speck in the incense-scented darkness. You may hear the solemn stillness broken by the clank of a retreating peasant, happy in the simplicity of her creed, and you will realise to some extent the use and meaning of our empty aisles and deserted chapels. But here, if you see any one, it is an open-mouthed tourist. If you hear anything it is the monotonous story of the verger, told with the same inflexions of voice at precisely the same spots, recounting the same scraps of history, and repeating the old classification of beauties from generation to generation.

To the mind of the verger, the most beautiful view in Wells Cathedral is the vista formed by the columns of the retro-choir and Lady-chapel, as seen from the choir; and it is truly lovely. Decorated work is here seen at its best. The whole group seems to be alive with beauty; every change of light makes itself felt as it does over the Weald of Sussex on a bright, fresh day when the clouds sail across the sky. But the vista is modern. If the high altar were there it would be extinguished. If such an altar were introduced as would befit the ritual for which the choir was built, lo! the "vista" would exist no longer. It would be blocked out, annihilated. "But why," says the tourist, "have a better altar than what is there now? An altar! what do you mean by an altar? Why don't you say 'communion-table'? Pray, don't sacrifice this fine vista, the most striking view we have ever seen, for the sake of something that only affects your ritual. Pay some respect to the love of beauty felt by tourists from all parts of England and America." What is to be done? Are the feelings of the few, who habitually use the cathedral, or the wishes of the many who come to admire, to prevail? Here is a dead-lock. Alas! Pan is dead.

It is the same story wherever we go. The cloisters are empty, save for the few who pace them out of curiosity. The retro-choir, the Lady-chapel,—what do the terms mean? The uses for which they were built have entirely disappeared. But let us go along the north transept and through a low door in the east aisle thereof. Here is something of interest. A great flight of steps leading up and up, through a beautiful arch and away to a closed door, which stops further view. Before passing through the arch some of the steps ingeniously sweep round and lead through another arch, divided by a slender shaft, into the chapter-house. The steps are worn terribly in places. How eloquent those wavy edges are! What generations of workers do they tell of! Here, at any rate, is life still. The life, no doubt, is vastly changed. From the topmost door which bounds the view, now descend young theological students instead of shaven priests. Through the double door of the chapter-house pass clerical gentlemen in truly modern garb, instead of the brilliant robes of four centuries ago; but the object of their presence is the same,—the proper government of their cathedral. The resolutions now passed within those walls are not so far-reaching as of old; the presiding dignitary can no longer dispense life and death, either spiritual or temporal. Indeed, the atmosphere is as much changed up here as it is down below in the sacred building itself. The Dean and Chapter, indeed, are absolute within their own jurisdiction, but their jurisdiction has shrunk since the old days. No longer need they concern themselves with heretics and backsliders, further than perhaps to admonish, perhaps to reclaim. Their thunderbolts are quenched, their swords are turned to ploughshares, their spears to pruning-hooks. No more shall they consign, with bell, book, and candle, any of their fellow-creatures to a life of outcast misery; and never again shall they light their path to heaven with the burning bodies of such as could not accept their theological views:—"Pan is dead."

NOTES.

FIVE fine Yorkshire properties, in the North Riding, are about to be sold during the ensuing season by order of the Marquess of Ailesbury's trustees. Set in portions of its best scenery, these include one of the fourteen abbeys and two of the numerous baronial fortresses for which the county is pre-eminently renowned. One property, the largest, is the Jervaulx Abbey estate,—lying in the valley of Wensleydale, and watered by the Ure. Comprising some forty farms and their homesteads, with smaller holdings, inns, mills, and the like, as also limestone and freestone quarries, it embraces an area of say 10,000 acres, yielding a net income calculated at 11,000*l.* a year. Many of our readers are, doubtless, familiar with the remaining ruins of the abbey church and its adjacent monasterial buildings. The four other properties are known as the Wath, the East Tanfield, the Tanfield Lodge, and the Whorlton Castle and Swainby Estates. In the last-named are situated the ruins of Whorlton Castle. On this estate (nearly 6,000 acres), which extends over the Scugdale valley to the Cleveland district, stand the works of the Carlton Iron Company, and here are believed to exist rich salt and other mineral deposits. The rents and royalties are estimated to be worth 3,500*l.* per annum. The Wath Estate, of 643 acres, is coterminous with the township of Wath, whose village tenements and four farms produce a rental of nearly 1,400*l.* The Tanfield Lodge and East Tanfield Estates are mainly agricultural, consisting in the aggregate of 3,800 acres, assessed at 3,600*l.* a year. By Tanfield Lodge are the lovely Hackfall ravine, on the Ure, and the Magdalen woods; whilst the foundation of Tanfield Castle, now dismantled, is attributed to John, Lord Marmion. The advowsons and rights of presentation to the livings of Swainby, Wath, East Witton, and Tanfield will be sold along with the several purchases, certain life interests of the present Marquess therein being duly reserved. Similar reservations are stipulated for in respect of the mansion, abbey, and curtilage at Jervaulx, and of Whorlton Castle, though the purchasers of these will not be precluded from becoming tenants in possession on completion of the purchases under agreements with the vendors.

THE experiments which that father of living engineers, Captain John Ericssen, has long been carrying on at New York with regard to the propulsion and guidance of torpedoes, are now about to be repeated at Woolwich. It is a matter of extreme significance, as regards the future of marine warfare, that the Nestor of the profession has laid aside the results of his long experiments on compressed air, and on electricity, as motors for the torpedo, in favour of the submarine explosion of gunpowder. The experiments as to this explosive action, as applied to a gun tube, which have long since been made, have been regarded as finally condemnatory of the value of the method. Nothing, however, that Captain Ericssen does can be regarded except with great respect. But, taking the case as put by him, a range of 300 yards under water is the utmost contemplated. If this is compared with the range of a projectile fired with 20 lb. of powder in the air, it will be seen at once how hostile hydrostatic resistance is to submarine firing. The experiments will be awaited with interest. But, considering the result proposed, it may be questioned whether the best outcome of such a system can at all compare with that of a shell fired through the air and arranged so as to explode at the moment of striking a vessel close to the water-line. The importance to an insular and maritime people like ourselves of an exhaustive knowledge of the capabilities of the torpedo cannot well be exaggerated. And as far as the national defence is concerned it will be good news for us all if we can be convinced that the truly irresistible action of the torpedo is defensive, and that as an implement of attack it is too uncertain in its results to compete with the more deadly aim and accurate time of marine artillery.

THE Secretary of the City Church and Churchyard Protection Society writes to the *Times* to protest against what is stated to be the intention of the Bishop of London, to deconsecrate ("desecrate" is the word Mr. Wright uses, which, of course, sounds much worse) four of the London churches, viz., St. Catherine Coleman, St. Olave (Old Jewry), St. Thomas in the Liberty of the Rolls, and Holy Trinity, Minories. The question whether these churches are really performing any useful function in providing for the wants of congregations is of course that on which the right or wrong of the proceeding really turns; and this is a question not in our province to deal with. We may, however, observe that there appears to be some tendency at present towards the revival of the use of churches for week-day worship, private as well as public, and that it should not be too hastily concluded that because a City church has for some time past been put to little use for the purpose for which it was built, it must necessarily be the same in the immediate future. If, however, it is clearly proved by experience that any particular church has really lost its reason for existence, except on grounds of purely architectural interest, we must be quite sure that the architectural and historic interest of the building is really so great as to compensate for the loss of the great public value of its site in these times of over-crowding and over-pressure. Our own feelings would lead us naturally to advocate the retention of every old City church where possible, and we hope the bishop will "do nothing rashly"; but if a building is really of no use, only considerable architectural beauty can justify its remaining where every yard of ground is of such value; and the architectural interest of some of the City churches has been rather exaggerated by enthusiastic *laudatores temporis acti*.

AN important and somewhat suggestive report on sewer ventilation has been issued by the Drainage Committee of the Richmond Vestry, aided by its officials. The old story of offensive smells from the gratings had been dinned into the ears of the Vestry; and it is worthy of note it is not recommended, as has been often the case, that the gratings should be closed up altogether. The system of ventilation within the parish comprises shafts and open gratings as near the centre of the road as possible. With the view, however, to the greater diffusion and dispersion of the sewer gas, it is suggested that the number of shafts shall be increased. It is important to note that public bodies are more and more recognising the principle that sewer gases become a dangerous nuisance if confined to cesspools or sewers; and that contact with the atmosphere renders them innocuous. The Vestry has closed manholes in obedience to the urgent request of ratepayers, but it has endeavoured at the same time to open vent-shafts, which work in connexion with the manholes in causing a draught of air through the sewer. The process of flushing adopted by the Vestry is that of a continuous stream flowing for a certain time through hose from the water-main, or by tidal water. In some cases the sewer at the point of the adjoining manhole on the fall is closed, and the intervening section filled and emptied rapidly.

A LARGE military hospital is being built in Rome, in the district known as Cœlius, and it has resulted in some very interesting archæological discoveries. Cœlius was one of the three great aristocratic quarters of ancient Rome, which has been excavated at different times in the sixteenth, seventeenth, and eighteenth centuries. Indeed, it has been a regular quarry for antiquarian remains, which has yielded a good proportion of the statues now in the various museums at Florence and Rome. The present discovery has been that of a very large mosaic, which formed the principal decoration of the vestibule in the house of Annius. It is in exceeding good preservation, having in the middle black figures upon a white ground, representing Tritons coming out of the sea. This has been carefully removed, and will form the parquet in the hall of the new hospital. Close by, another mosaic has been found, representing two young athletes wrestling, with their instructor looking on, and the partial inscription, ... VICTUS ES. Another interesting find has been that of a summer-house ornamented with frescoes, and supposed to have formed a portion of the Villa Casali, where, a short time ago, a broken column was unearthed, of red marble of a kind and colour totally unknown to the marble-cutters of modern Rome. The archæological committee which takes cognisance of these things has inspected it and given it the quasi-geological name of breccia di Casali.

THE "Caisse de Défense Mutuelle des Architectes" has made up its list of officials for the year 1886 as follows:—President, M. Bailly, President of the Société Centrale, &c.; Vice-Presidents, MM. Achille Hermant, F. Rolland, and Dormoy, of Bar-sur-Aube; Treasurer, M. Feydeau; Vice-treasurer, M. Bartaumieux; Secretary, M. Charles Lucas; Assistant-secretary, M. Tournade; Honorary Member of the Committee, M. Questel, Past-President. The Caisse, which was only founded last June, already counts its hundred members in Paris, seventy members in the departments, and ten associated societies.

FAVOURED by remarkably fine weather, marked progress has been made in the erection of the buildings for the forthcoming International Exhibition at Edinburgh. At a meeting of Operative Masons, held in their hall, last week, it was suggested by Dean of Guild Gowans that the masons of the city should hew two shapely and well-proportioned pillars, to be erected opposite the entrance to the Exhibition buildings, at the west end of the meadows, somewhat after the style of those existing at the northern and eastern entrances to the meadows. He would give his share of the stone, and he had no doubt other owners of quarries would do the same, so that the stone would be an exhibit by the quarry-masters, while the labour would be the contribution of the working masons of Edinburgh. The Chairman of the meeting suggested that an arch should be erected rather than pillars merely, and a committee of twelve was formed to consider what form the trophy should take, and to make arrangements for giving effect to the resolution.

THE ninth annual dinner of past architectural students of the École des Beaux Arts last week drew together about a hundred guests between the ages of thirty and eighty. M. Charles Garnier was in the chair, supported by MM. Questel, Bailly, Diet, and other members of the Institut de France. The toasts were proposed by M. Hénard, Architect to the City of Paris, and by MM. Garnier and Questel. The *spirituel* and perfect drawing of the *menu* card was by M. Adrien Chancel.

THE Commercial Bank of Scotland was the first of the chartered banks in Edinburgh to erect a sumptuous building in the new town as their place of business, an example which has been followed by the other banks, with the exception of the National Bank, and that bank, it is said, has, from time to time expended as much in tinkering-up and altering their premises as would have covered the cost of a new structure equally imposing and convenient with the others. The telling-room and entrance-hall of the Commercial Bank are both stately and effective, but the pillars with which they were adorned were formed of wood painted to imitate marble, and the floors were laid with colourless pavement. The pillars in the telling-room have been superseded by columns of black Devonshire marble veined with red and grey, and the Corinthian capitals are of bronze. Those in the hall are of emperor's red on bases of Belgian granite. The stone pavement has been lifted, and a marble mosaic floor substituted, the central feature of which, in the telling-room, shows the cognisance of the bank,—a female figure seated, representing Commerce. Other alterations have been made with the view of securing better light, &c., and the walls have been appropriately decorated in colours and gold. The alterations were carried out under the superintendence of Mr. Sydney Mitchell, architect.

THE past year's volume of the *Portfolio* shows that this high-class art periodical fully sustains its reputation. There is not one, we think it may be said, among the numerous illustrations in it which is not good of its kind; there are some among the more important and larger ones which are splendid. Among these may be mentioned "Magnolia Grandiflora," an etching by Mr. G. M. Rhead; "Val d'Aosta," engraved by Mr. Alfred Dawson from Turner's water-colour drawing; and "The Mother," an etching by Mr. W. Strang. Architectural subjects take a considerable place in the volume, and are very well illustrated in plates and sketches. Mr. Loftie contributes an interesting series of articles on "Windsor," and Mr. Watkiss Lloyd another series on "The Drama of the Greeks in relation to the Arts," with illustrations from Greek vases.

ON Saturday, the 19th, the first grand "commercial and industrial" fête took place at the Tribunal of Commerce. Mirrors, hangings, carpets, hot-house plants, and thousands of lights (candles, oil lamps, gas, and electricity), combined to make a veritable Eden of this commercial Palais de Justice, the most admirable parts of which were the grand staircase and the covered court with its two stages of porticos, above which was hung a white and yellow *velum*, whose tints repeated the effect of the gas and electric lights. MM. Alphand, president of the committee; Michau, president of the Tribunal de Commerce; and Bailly, architect of the building, received the guests, among whom the marked absence of the official world was deplored.

IT is in many respects to be regretted that, owing to the increase of the population in the capital of Italy, several of the fine old houses built by the patrician families of Rome during the fifteenth and sixteenth centuries are being bought up for the purpose of being demolished, and their sites covered with shops and residences adapted to modern requirements. The princely families to which the old villas belong are mostly in rather needy circumstances, and the sums offered by building speculators for the sites of their ancestral houses are too tempting to be resisted. Plots of ground in eligible positions within the city fetch enormous prices. Thus a well-known clothier and tailor of Rome, named Bocconi, has just paid the sum of 875,000 francs, or 35,000*l.*, for one-half the vacant area opposite the Chigi Palace. The purchaser likewise offers to architects a large premium for the best design for the new establishment he intends to erect and open in that part of the Corso.

A CURIOUS communication in regard to ventilation appears in *Nature*, in the shape of a letter from Mr. Fletcher, of Warrington, stating that he had tried the expedient of having an outlet over the chandelier in each room carried across to the chimney-breast, and run up side by side with the chimney-flue, with the view, of course, of quickening aspiration by the additional warmth of the chimney-flue, but that the effect was the reverse of what had been intended, and whenever the fire was lighted the ventilating-flue set up a back-draught. "In the absence of any fire there is a strong upward current in both, but the instant the fire is lighted the upward current in the ceiling ventilator stops, and in a few minutes is reversed, the cold air and collected smoke from the chimney outlet coming in with such force that we have been compelled to make up every ceiling ventilator in the house except one, which, although useless when a fire is lighted, is not a nuisance." We have no doubt Mr. Fletcher is right about the facts, but the explanation of them is probably simpler than he thinks. Has he any inlet in his rooms for fresh air proportionate to the combined area of the chimney and the ventilating shaft? If not, of course, when the heat of the fire sets up a current to the fireplace, it draws in air to supply its place through the most commodious inlet, the flue in the ceiling, and a circulation system is set up between the two. Let Mr. Fletcher provide a more direct and a sufficient inlet of air to the fire, and he will no longer have down-draught from his chandelier chimneys.

ENGLISH PORCELAIN.

THE small book published under this title* is one of the South Kensington Art Handbooks, and deserves to be called one of the best of that voluminous series. It is a small book of about 100 pages, not counting the illustration pages, but not a page in it is wasted, and the main facts in regard to the history of the various English manufactories (the majority of which are now extinct), the character of their work, and the marks by which it may be known, are given in a clear and consecutive manner, each class of work being illustrated by very well executed engravings of typical examples.

The consensus of fashion in regard to the interest in and taste for china in this country is curiously illustrated in the nearly simultaneous dates of the founding of the principal centres of manufacture. The earliest known or the earliest dated Chelsea work is 1745. How long the manufacture there had been carried on previous to that date there appears to be no evidence, but Professor Church thinks it clear that these were by no means first attempts, as they exhibit proficiency in the craft. Still, we cannot suppose that the Chelsea manufacture was many years previous to the earliest known dated piece. The works at Bow probably date, our author considers, from the patent taken out by Edward Heylyn and Thomas Frye in 1744. The Derby factory probably dates from just before 1750. The partnership deeds for carrying on the Worcester Tonquin manufactory are dated 1744. Cookworthy, the founder of the Plymouth manufacture, had had his attention directed to the subject of kaolin and its capabilities in 1745, though he did not achieve the mastery of the manufacture till some years later. The Bristol manufacture can be traced back to 1753, though then in a crude state. Thus it seems that nearly within the same decade the demand arose sufficient to prompt the formation of all the principal schools or centres of manufacture of porcelain or "china," to give it the name attached to it then and which has clung to it more or less ever since. The connexion of the English manufacture with Chinese example, so obvious in the decoration of much of the earlier work, is curiously exemplified in the name of "New Canton," which was given to the now long-since extinct but once extensive works at Bow.

Professor Church's book is, as we have said, an excellent and portable manual of the facts of the history of British porcelain, and for these we refer the reader who is still in a state of Chinese Paganism, as ignorance on this subject may perhaps be called, to the pages of the handbook. We venture a remark or two on the art-criticism side of the subject, in regard to which we also shall possibly be regarded by the elect as in a state of Paganism. For in regard to much of the work so well illustrated in Professor Church's pages we hold that it is fashion alone that gives it much value from the point of view of abstract artistic judg-

* English Porcelain. By Professor A. H. Church. Published for the Committee of Council on Education, by Chapman & Hall. 1886.

Fig. 1.

Fig. 2.

Examples of English Porcelain.

ment. China was a matter of fashion when it came in, and it has now mounted to the uppermost rim of the wheel of fashion again, and prices are given for genuine articles of Worcester and Chelsea make which would not have been dreamed of even when the fashion of the last century was at its height. Of course the apparent difference in nominal coinage is greater than the actual difference in the "rateable value" of the same article now and a century ago; but still the sale of the same famous piece of "Chelsea" for three guineas in 1773, and for 29*l.* 10s. in 1883, represents a considerable development of "unearned increment."

This wholesale throwing about of guineas is too often carried on quite irrespective of any value which an unbiassed judgment would attach to the pieces for which such large prices are paid, if considered on purely artistic grounds. Artists themselves appear unable to discriminate, and when once they begin collecting china they are as blind in their admiration and pecuniary enthusiasm for mere rarities as the most unenlightened *dilettanti*. A considerable proportion of the china which is run after and bid for is in reality at variance with every sort of purity of taste. A Greek artist would have sickened at it. Gross imitations of natural foliage in ragged protuberance of relief, made "more rawer" by gewgaw colouring; rococo forms, vulgar in themselves, made more vulgar by "parcel gilding" (as it would be called in the South Kensington tongue); fat-faced stumpy figures of shepherds and shepherdesses, poor enough as models, and bedizened with coloured finery; these are not surely the kind of works to take the eye and spirit of the artist. Prof. Church displays lucid moments of criticism in speaking of some of these things; but how far he is carried away from the centre, and how poor is the real level of the porcelain figure work, is obvious in connexion with the illustration of the Derby "Diana," a white biscuit statuette in the "Museum of Practical Geology" collection (what has a biscuit Diana to do with practical geology, by the way?). He calls this "an exquisite example" of Derby work; all that can really be said of it is, that it is better than a great many of the porcelain figures; in any other light than a china-fancier's it would be called a vulgarly-modelled commonplace thing.

We should like to see china collectors gauge the value of their acquisitions a little more by considerations of art, and less by mere fashion and considerations of scarcity, and the wish to secure something that Jones has not got in his collection, and of which a duplicate is not known to exist. We have little expectation of seeing it, however; collectors of all kinds are mostly mad. By way of pointing our remarks, however, and presenting our readers with favourable examples of the illustrations, we subjoin (by the kind permission of the publishers) two examples of really artistic English porcelain, in a pure and refined taste. Fig. 1 is a covered cup and saucer of Derby work; fig. 2, a sugar-basin and cover of the manufacture of Laughley (Shropshire), rather later in the century. In these examples there is elegant form, appropriate to the material; delicate and well-applied decoration; and no bunches of gewgaw imitation flowers, or shell-work, or such nonsense.

NEW REGULATIONS FOR PUBLIC TENDERS IN GERMANY.

The re-adjustment of the various regulations affecting tenders is a subject which has of late years attracted considerable interest in German technical circles. Following up previous action, the Government last year invited a number of leading industrial authorities to join in a revision of the existing system, and this step has now led to the issue of a new series of regulations by the Prussian Ministry of Public Works, of which the following are the principal features:—

I.—MODE OF GIVING OUT TENDERS.

Work and materials are, as a rule, to be tendered for publicly, but the following exceptions from publicity in the final tendering are permitted:—(1) Work and materials which can only be suitably executed or supplied by a limited circle of contractors. (2) Work and materials for which suitable proposals have not been received in a public tender already held. Contracts can be made without any tender:—(1) Where the estimated cost does not exceed 50*l.* (2) When there is urgency for execution. (3) Where the work necessitates particular artistic skill. (4) In supplementary orders for materials to complete the total requirements of a work, provided no higher price is paid than that of the principal delivery.

II.—MODE OF PROCEDURE.

1. *Object of the Tender.*—This must be definitely indicated in all essential respects. Regarding accessory circumstances affecting the calculation of prices, details are to be given of sufficient completeness to allow of a proper appreciation of their importance. The periods of time for deliveries to supply continuous requirements are to be arranged according to the special circumstances of each case. Tenders of an extensive character are to be so divided as to allow the participation of smaller contractors and artificers. Therefore, in larger works of elevated building, the division would correspond with the various branches of trade and labour. Specially extensive divisions may be further made into lots. Unusual requirements not customary in trade are only to be applied, so far as is absolutely necessary, to the quality and measurement of goods or work. When such knowledge is of importance in appreciating the quality of articles delivered, the competitors may be required to state the names of the manufacturers by whom the goods are to be supplied. Sufficient time is to be allowed for the execution of work or for making deliveries, and when the term is, from reasons of urgent necessity, exceptionally short, special rapidity should only be prescribed for the portion first required.

2. *Announcement of the Tender.*—In announcements through the press, attention is to be paid to the regulations as to using official journals. These advertisements must contain, in compressed form, such information as is of importance in deciding interested persons to compete (division into lots, time of opening tenders and of adjudication, cost of plans, details, &c.).

3. *Time of opening Tenders.*—When special circumstances do not require an earlier date, this should be within fourteen days for smaller works, and four weeks for those of a more extensive character.

4. *Time of Adjudication.*—This should be at as early a date as possible (more particularly in the case of materials liable to variations in price), and should not exceed fourteen days as a rule, or four weeks when the approval of superior authorities has to be obtained.

5. *Conditions of Competition.*—Those named in the special memorandum which follows are to be applied to public competitions. They are likewise applicable to limited competitions, with the exception of the clause as to payment for drawings, &c.

6. *Opening Tenders.*—Competitors or their representatives are alone entitled to attend. The tenders are to be read without indication of their sources. A protocol is drawn up of the proceedings in which the offers are inscribed after the names of the competitors, and this document is executed by the parties present. The publication of the offers and of the protocol is not to be permitted.* If there are no special inquiries necessary as to the most acceptable offer, and if the presiding official is empowered to decide as to the adjudication, this can take place at once.

7. *Adjudication.*—No preference is to be given to the lowest tender as such, and the adjudication is only to be made to a tender in every respect acceptable and guaranteeing the efficient and punctual execution of the intended work. The following classes of tenders would be excluded:—(*a*) Those which do not correspond with the conditions laid down; (*b*) those which, according to types submitted, are unsuitable; (*c*) those which are evidently out of proportion to the normal value of the work, so that efficient execution could not be expected at the price. An exception would be allowable in the last-named case, if the competitor were reliable and capable, and could justify the quotation given. As a rule, the adjudication in public tenders would be given to that offer of the three lowest which would be considered the most acceptable upon taking into consideration all the circumstances affecting the case. In limited tenders, where the merits of the competitors are in other respects equal, the lowest offer would be selected. Where the working out of details as to constructions and appliances is left to the competitors, the offer is to be selected which is considered the most suitable for the case in point, and the cheapest in consideration of all the circumstances involved. If none of the lowest tenders thus referred to is considered acceptable, all the offers are to be refused. In the case of building work, where several equivalent quotations are received, those competitors who live at or near the locality of the work are to receive a preference.

III.—FORM AND DRAWING UP OF CONTRACTS.

1. *Form of Contracts.*—A written agreement is, as a rule, to be drawn up, expressing the contract made by the adjudication. The follow.

* A correspondent of the *Eisen-Zeitung*, while admitting the injury which is done by the general diffusion of the results of tenders, calls attention to the disadvantage which would be suffered under these circumstances by persons tendering who had no representatives on the spot, and whose own attendance was not practicable; this being a matter in which the coal trade is specially interested.

ing exceptions are allowable, without the legal validity of the contract being impaired:—(*a*) Contracts of less value than 50*l.*; (*b*) work done day by day; (*c*) contracts, respecting the essential conditions of which an understanding has been arrived at by correspondence. In the latter case the use of order forms and the mutual acknowledgment of written notes should insure the proof, if necessary, of the essential points of the contract made.

2. *Drawing up of Contract.*—This must be concise, but also definite and clear. General contract conditions should be laid down for the separate groups of works which occur more frequently, and the changes necessitated by the application of these conditions to any particular description of materials or work should be expressed. Besides reciting the principal facts connected with the tender and adjudication, the contract should specify (*a*) the object to be carried out, and (if so desired) the source from which the material is to be obtained. (*b*) The dates for partial and complete execution. (*c*) The amount and mode of payment. (*d*) The amount of any conventional penalty, and the circumstances under which this would be enforced. (*e*) The amount of any security to be lodged, and the obligations of which it is to guarantee the fulfilment as well as the circumstances under which it is to be returned. (*f*) Details as to the taking-over of work or deliveries, as well as the extent and duration of the guarantee to be given by the contractor. (*g*) Provisions as to the eventual appointment of arbitrators and an umpire.

There should be mutual acknowledgments of estimates and drawings, as well as of detailed technical directions, which would be appended to the contract. The generally adopted conditions for contracts (quoted in detail as an appendix to the new regulations) should be affixed to the contract, in which their validity would be recognised, subject to the alterations and omissions which would be made in the copy attached.

IV.—CONTENTS AND EXECUTION OF CONTRACTS.

The obligations imposed upon contractors should not exceed the measure of those which private persons are accustomed to undertake under similar circumstances. The contractor has rights which should be expressed as clearly as his obligations. These affect:—

1. *Payment.*—This should be hastened as much as possible, and, when the work is to extend over a long period, instalments should be arranged for, a similar provision being suggested when a delay of entire payment is necessitated by the detailed examination of the work done. A subsequent withholding of an agreed instalment for the purpose of increasing the amount of security would only take place if claims had already been made upon the contractor which the security in hand did not cover.

2. *Security.*—Admission to a competition by tender cannot be made dependent upon security being previously given, but in cases where this step is considered necessary the prompt furnishing of security can be demanded before the adjudication is made. The amount of the security and the duration of its validity or retention should not be more than necessary to secure the givers of the work from eventual loss and should not, as a rule, exceed 5 per cent. of the contract amount, being given either by a cash deposit (money, papers of value, State Railway bonds, &c.) or by the guarantee of responsible persons. In case of a depreciation of the bonds, &c., held as security, further cover may be asked from the contractor. When the guaranteed obligations have been fulfilled, the return or release of the security is to take place without delay.

3. *Increase or Decrease of Quantities.*—There should be no reservation for a one-sided increase or diminution of the agreed work or deliveries coupled with the maintenance of the contract prices.

4. *Conventional Penalties.*—These should only be stipulated for when important interests depend upon the punctual execution of the work, and should not be asked for when the contract is for anything which could in case of need be readily procured elsewhere in the requisite quality and quantity.

5. *Control of Execution.*—The givers of the contract have the right of supervision, as to the execution of what has been agreed upon, in works, workshops, work-places, &c. The control of the building operations would likewise extend to seeing that the contractor fulfilled his stipulated obligations towards the artificers and workmen. If from the neglect of such obligations the progress of the work should become doubtful, it would be allowable to make payments for account of the contractor direct to the interested persons. When the productions of special manufacturers are specified, arrears in deliveries should be notified to them.

6. *Differences.*—Arrangements would be made for arbitration and eventual further reference. Arbitration as to the mode of executing building work would only deal with such claims for compensation which might be founded upon such mode of execution.

7.—*Expenses of Contracts and Stamps, &c.*—The expenses of making contracts would be equally divided between the two parties. The legal enactments as to the stamps being paid by the persons giving the work would be followed. Postage, telegrams, &c., in the interest of the conclusion and execution of contracts would be paid by each of the parties incurring such charges.

An appendix (referred to in Division II., section 5) contains a number of detailed regulations as to the sending in of tenders, the steps involved in communicating the results of adjudications to those interested, the deposit of security, &c. A second appendix contains the general conditions of contracts for the execution of building work, which have already been alluded to (III., 2). The main features of these conditions have in some cases been incorporated with the regulations of which details have been quoted; this being the case as to the inspection and taking over of work, payments, claims, security, arbitration, cost of drawing contracts, &c. The following points of a special character are likewise dealt with:—

The contractor or his representative must attend at the building site to consult with the officials in charge of the work when the latter consider it necessary. These officials have the control of the contractor's workmen in matters affecting the execution of the building work and the maintenance of order. The contractor has to construct the necessary closets, &c., and to be responsible for their being regularly cleaned and disinfected as well as their subsequent removal. The watching of his scaffolding, tools, and materials on the building site is incumbent upon the contractor. While the scaffolding erected by the building contractor is standing, workmen belonging to other branches can use it gratuitously, but he is not obliged to make alterations for the convenience of the latter. The contractor is responsible for the due observance of official regulations in all matters within the scope of his contract obligations. Without prejudice to his responsibility for the strength and general efficiency of his scaffolding, he is obliged to complete or strengthen it without delay at his own expense upon being ordered to do so by the officials in charge. He is likewise responsible for the acts of his deputies, assistants, and workpeople in the execution of the contract.

The contractor is not empowered to transfer his contract responsibilities to another person without the consent of the authorities conducting the work. If he fails before the fulfilment of the contract, the building authorities are entitled to annul the contract from the day of the failure; payment being in this case treated according to existing regulations. In event of the contractor's death before the complete fulfilment of the contract, the building authorities have the option of continuing the contract with his heirs or of considering it annulled.

Proposed Palace of Justice at Munich. The Bavarian Government has determined to erect a new Palace of Justice in Munich, the capital of Bavaria, the accommodation hitherto existing for the principal tribunals of the kingdom having proved entirely inadequate. The question of the site of this new and extensive edifice, which will be a great ornament to the art-loving city on the Isar, is at the present time agitating the architectural and Governmental circles of that capital. Opinion appears to be inclining in favour of the choice of the extensive and open area near the so-called "Cadettencorps," which, although rather distant from the centre of the city, is probably the finest site that could be selected.

ENGLISH HOMES IN THE SEVENTEENTH CENTURY.

ARCHITECTURAL ASSOCIATION.

THE fifth meeting of this Association for the present session was held on the 18th inst., at Conduit-street, Mr. C. R. Pink (President) in the chair.

The following new members were elected, viz., Messrs. W. H. Burt, C. R. G. Hall, C. Ovenden, F. M. Coley, H. J. Wembridge, S. J. Sampson, M. S. Stokes, R. S. Maynard, H. J. Ellis, W. J. Wilsdon, A. S. Rowe, J. J. Cotten, F. C. Schweder, Henry Berney, and T. E. N. Woodgate.

Mr. J. A. Gotch (Vice-President) then read the following paper on "English Homes in the Seventeenth Century":—

Gothic architecture was moribund. The pulses of its long and brilliant life were waxing faint and feeble. Its supple Early English youth had passed into the beauty of Decorated manhood, and this, in its turn, had matured to the calm grandeur of Perpendicular old age. And now, all its cunning forgotten, or only remembered at melancholy intervals, its mightiest efforts little better than forlorn caricatures of its ancient prowess,—it stood ready to take leave of the world, its best friends hoping that so noble a career might have a speedy and painless end. Their wishes were granted; for presently came the joyous Renaissance, with its merciful hand, and quietly stifled the worn-out veteran. A few of the old man's effects were retained in affectionate remembrance, and then the youthful stranger stepped forth before mankind the acknowledged heir of dead Gothic.

The period of which this young style was the product was one of the most interesting and important in the history of the modern world. To its influences we owe all that we now enjoy of comfort and freedom. Perhaps the four principal events which have moulded modern ideas are the invention of printing, the discovery of a new world in America, the Reformation, and the rise of English literature: all of these sprang from the re-awakening called the Renaissance.

The influence of printing on the spread of new ideas in the sixteenth century was incalculable; it was one of the great agents that shaped events and the men who took part in them. The discovery of America gave birth to a spirit of enterprise and a love of adventure which tinged the whole spirit of the times, and gave us Francis Drake, Martin Frobisher, and Sir Walter Raleigh. The Reformation gave us the English version of the Bible; it gave us the Puritans, whose spirit is still abroad; and, which is more to our present purpose, it gave to the nobles and squires of England the enormous funds of the suppressed monasteries, with which, in the fulness of time, they built themselves the houses we are about to explore. Modern English literature may be said to commence with Shakspeare and his contemporaries, and it is in the pages of Shakspeare and his fellow-workers that the most vivid pictures may be obtained of the home life of the period; for wherever the scene is laid,—whether in Italy or Greece, in Verona, in Arden, or in Fairyland,—it is England which is really pourtrayed. Men and women walk across the stage in foreign garb, it is true, and call each other by hard foreign names, but beneath the surface they are all English; their speech bewrayeth them. Therefore, if I quote them rather freely, I trust you will not think, them tedious, but rather regard them in the light of contemporary witnesses of great importance.

History will tell us of the heroes of those times. The printer has recorded the labours of his ancestors, and their comrades of the Renaissance. In the great book of History we may read of the founders of the American nation; of the first colonisers; of the first colony, called Virginia, after the virgin Queen. There we may learn the names of the mariners who humbled the pride of Spain; of the statesmen whose wise counsels, falling into the ear of an astute princess, lifted England into the rank of a first-rate power. There, too, we may watch the flames kindling round devoted men, whom we call martyrs if we agree with their views, and fanatics if we do not. There we may read the story of hunted priests and persecuted Papists, and how they tried at one great blow to revenge themselves, and turn the wheel of Fortune, on a certain 5th day of November. In History's pages we may mark the brilliant fancies, the exuberant wit of Elizabeth's days, slowly

changing to the sober earnestness, the Puritanical harshness, of the times of James I. and his ill-fated, arrogant son. We may there watch the people of England silently taking sides for the great struggle that cost Charles his head, and gave England her freedom. We may see the nobles, the squires, the citizens,—the Fairfaxes, the Hampdens, the Miltons,—girding them for the strife, and striking a good blow with sword or pen for the cause they had at heart. Of all these great doings we may read in history, but let us to-night forsake the great, broad, beaten track, and stroll down the quiet by-ways. Let us visit the homes of the men of whom we have read,—of Burleigh and Raleigh; of the Gunpowder Plotter who would fain have been a hero had he dared; and of the country squire who at the call of duty suddenly found himself a hero against his will. Let us see the houses they lived in, and the gardens amid which their dwellings were set. If we can picture them in their habits as they lived, we cannot fail to obtain a better grasp of the stirring times in which they moved.

When Sir John Falstaff went recruiting into Gloucestershire he paid a visit to an old comrade of his, a country squire, one Justice Shallow, who lived in such a house as we will now examine. Its outer door is approached by an avenue of newly-planted trees, and itself opens into a court enclosed by a far-stretching stone balustrade. Above the door is the coat-of-arms of Shallow,—the twelve luces,—the fresh-water fish of which the justice was so proud, although, good man, he cheerfully admitted that the salt-water fish was an old coat too. Some Shallows of the richer sort had large entrance lodges to their outer courts, such as may be seen at Charlcote, near Stratford-on-Avon, where the Sir Thomas Lucy lived who caught Shakspeare stealing his deer. Others, again, would have no court at all, and, consequently, would need neither door nor entrance-lodge in the wall thereof; but, in a house with any pretensions to be considered a mansion, there would most probably be a courtyard.

On the other side of the court lies the house, fair, square, and symmetrical, with a projecting gabled wing on either side, a porch in the middle, and here and there a canted bay-window serving to relieve the general squareness of the building. The windows have narrow lights and thick stone mullions and transomes, for people were then hardly alive to those beauties of prospect which afterwards led them to adopt the wide and lofty sashes of the palmy days when Queen Anne (who is now dead) sat upon the throne.

Each floor is marked by a string or cornice of more or less incorrect classic profile, while the summit is crowned by an open balustrade running from one dainty gablet to another, and connecting together the great chimney-stacks which rear themselves aloft in the semblance of classic columns. At intervals along the balustrade and at every corner where it starts on a new career, rise square pedestals, supporting perhaps an heraldic animal, perhaps an urn, perhaps merely a ball, but always serving to give rhythm to the composition. In the blank spaces of the walls below you may frequently see niches containing an unflattering image of some ancient worthy,—a monarch, a soldier, a philosopher, or a poet,—or else the counterfeit presentment of one of the heathen gods, which, if it be a faithful likeness, wraps one in unspeakable wonder at the awe those deities inspired. Perhaps, the frieze of the cornice contains a long legend couched in the Latin tongue, but more frequently is to be found something short and pithy over the door or on some of the panels that embellish the porch. Entering the porch, we find at the other end a nail-studded door with a primitive knocker in the shape of a ball of iron hanging by a chain at a convenient length to fall upon one of the largest of the nails.

The porch leads into a vestibule or passage, one side of which is formed by a handsome carved screen, sometimes of stone, but generally of oak, separating it from the hall; the other side is a solid wall, in which appears the buttery hatch. (See the lower of the two plans on the lithographed page of plans. It is not named, but is that of a squire's house, with court and gatehouse.) This arrangement is universal: the passage, never more than 12 ft. wide and generally only 4 ft. or 5 ft., with the hall on one side of it, and the buttery on the other. There was as yet no entrance-hall, as we understand it, that is, a cold waste space devoted to hats and coats, hard chairs, a barometer, and a few bad pictures, though that feature was shortly to appear; but there was always this passage connecting the entrance with the servants' offices, and being in reality part of the great hall cut off by the screen.

The buttery is described in Bailey's "Dictionary" as "a place where victuals are set up," and its importance is manifested by the prominent place accorded to it on all plans of the period. Dinner was served from here, and food (particularly of a liquid nature) was dispensed to all who had any claim to it, and to many who had not. One of the virtues of the "old worshipful gentleman" of the seventeenth century song was that he had "an old butery-hatch worn quite off the hooks." This ancient arrangement and the use of passage, buttery, and hall may still be seen in many of the colleges at Oxford and Cambridge.

The hall itself was one of the chief features of a seventeenth-century house. In its position and size it was a survival from those days when the common hall served as feeding and sleeping-place for the whole household; but by the time of which we treat to-night the servants had been removed to their own separate department, and the family alone used the hall, except on occasions of festivity. The aspect of such a hall is tolerably familiar to all of us,—a large, lofty apartment, panelled half-way up to where the great roof springs from wall to wall, leaving its highest spaces filled with the gloom of low light and much smoke. Its walls are hung, as the old song just quoted says,—

> "With pikes and guns and bows,
> With old swords and bucklers that had borne many shrewde blows."

At one end is the screen through which we passed from the passage, panelled throughout, and rich with fantastic carving. Over it is the minstrel's gallery, already beginning to sink into silence, but carrying on as yet the ancient traditions of the "joyous science." At the other end is the daïs, where at meal times the master sits in state. The daïs is another survival from old times, but it still occurs in many of the new houses of the period. It is simply a step, some 4 in or 5 in. in height, stretching across the room. Almost invariably one end of the daïs terminates in a large bay window commanding a view of the entrance court. The rest of this side of the hall is taken up with large windows running up to the start of the roof, and filled with coloured glass where the sunlight sparkles amid the scales of the twelve luces of the shallows, or gilds the lines of some pale face looking out from a pearl-decked head-dress. Over against these brilliant pictures, whose hues are led by the wintry sun across its fantastic front, is the fireplace,—a cavern wherein a tree-trunk may be burned. Its chimney-piece, like the screen, is panelled all over, sometimes in wood, sometimes in stone. It abounds in wreaths, and knots, and ribands; in grotesque heads growing out of curious pilasters, and crowned with Ionic volutes; in panels of jewels, and straps, and scrolls. Perhaps all this wealth of carving is only a magnificent frame to the family arms: perhaps it serves to surround statues of some Classic abstraction, "Justitia" or "Prudentia," "Arithmetica" or "Geometria"; something sententious it is sure to be, if only a Latin motto. If the central object be the family arms, most likely there will be two shields; one without any quarterings, bearing simply the arms of the family as a family; the other being the arms of the particular member of the family who caused the work to be done, and setting forth all his descents and alliances unto the third and fourth generation, and yet further. The screen, too, among its many ornaments, will have the family device, and so will the panelled ceiling. The house was built for the family, and proclaims its purpose at every turn. The arms, the crest, or the motto occurs in every possible place; in gables, in finials, on the parapet; on the water-spouts, on the weather-cock, on the sundial. They are carved on the screen, they are painted on the windows, they are moulded in the plaster friezes, they are cunningly wrought in the escutcheons of the locks. The family animal grins at you from the gate-post, he sits open-mouthed on the newels of the staircase, you lay hold of him when you poke the fire. He was a godsend to the craftsmen of those days, and right well did they make use of their opportunities.

From the hall several doors lead in different directions. Through the screen where we entered is the way to the servants' department. From the daïs end the private apartments are approached, and access to the upper rooms is obtained. It will at once be seen, therefore, that the family occupied one side of the house and the servants the other, their common meeting-ground being the hall. Sometimes, indeed, the servants were relegated to the basement, and all their offices were underground, an arrangement constituting (so far as I know) an entirely new departure in house-planning at that time. But, as a rule, they were located on the ground-floor, and their department was usually on a large scale. Country houses in the seventeenth century had to depend entirely on their own resources. They had to provide their own butchers and bakers, grocers and brewers. The larger houses had such offices as these:—laundry, dairy, cheese-room, brew-house, malt-house, hop-house, slaughter-house, fish-house, and bake-house, which shows that they could not rely on the visits of either the washer-woman, the wine and spirit merchant, the butcher, the fishmonger, or the baker. Of course, the principal apartment on the servants' side was the kitchen, almost always a large room with an enormous fireplace (in the chimney of which the smoke-jack turned), and often an oven. Next to the kitchen was the "pastry," a smaller room containing two ovens,—a large one and a small. Reference is made to this obsolete apartment in one of the plays of the time, where it is a recommendation of the heroine as a wife that "she can do pretty well in the pastry." Then there were the pantry, the dry larder, the wet larder, and the boulting-house, or place for boulting meal, that is, separating the meal from the bran. Very frequently there was a "surveying place," which was, probably, a serving-room; and in some houses may be found a "servants' day-room," a "hall for hynds," a place for pewter, a scullery, and a spicery. These, however, were only to be met with in the larger houses; but in every house were the kitchen, the pastry, the larders, and the buttery, with its stairs down to the cellar. These were essentials even in small houses. Reference has already been made to the importance of the buttery; the presiding genius of that place had a position corresponding to his environment. The butler was the principal servant, and acted as *major domo*. He had command of the cellars, the food, and the household stores. He is the favoured servant in the stage plays, and is left in charge when the master goes away. He looks after the young gentlemen, and in one place one of the fraternity tells us how these youths would sometimes cut their supper in the kitchen, and take it to the buttery to eat and to wash down with a good draught of ale.

Let us now again cross the hall and go to the family apartments. Here we find a parlour, or a "summer parlour" and a winter parlour," though not unfrequently the winter parlour is on the same side as the kitchen, perhaps with a view of ensuring hotter dinners. There is sometimes a special "dining chamber," which shows that the hall was gradually losing its old character of the eating-place, and becoming an entrance merely. If the house were large, it would perhaps have a "withdrawing chamber," and a "smoking-room" for the consumption of the new and fashionable weed, tobacco. Many country houses had a "chapel" in them; some had also a "chaplain's room" and "his study"; but these luxuries were reserved for the more wealthy.

Of staircases there was no lack. There were always two, one for the family and one for the servants, and in the larger houses they seem to have been put wherever there was a little spare space. They were one of the features in which the old workmen delighted, and which gave them some scope for design. They were broad and easy of ascent. From landing to landing they went, seven or eight steps at a time; at every turn there was a great newel-post, a solid mass of wood, panelled, and moulded, and sometimes carved; from newel to newel stretched a massive handrail, wide and deep; and from it to the string-board the space was filled with thickset balusters, fat, round, and substantial. No thin, winding mahogany handrail with "inch-square bar balusters every tenth of wrought-iron," and a mean-wreathed end at the bottom, but everything solid, broad, and monumental. Indeed, the grandeur was sometimes carried beyond the strict limits of common sense, for,

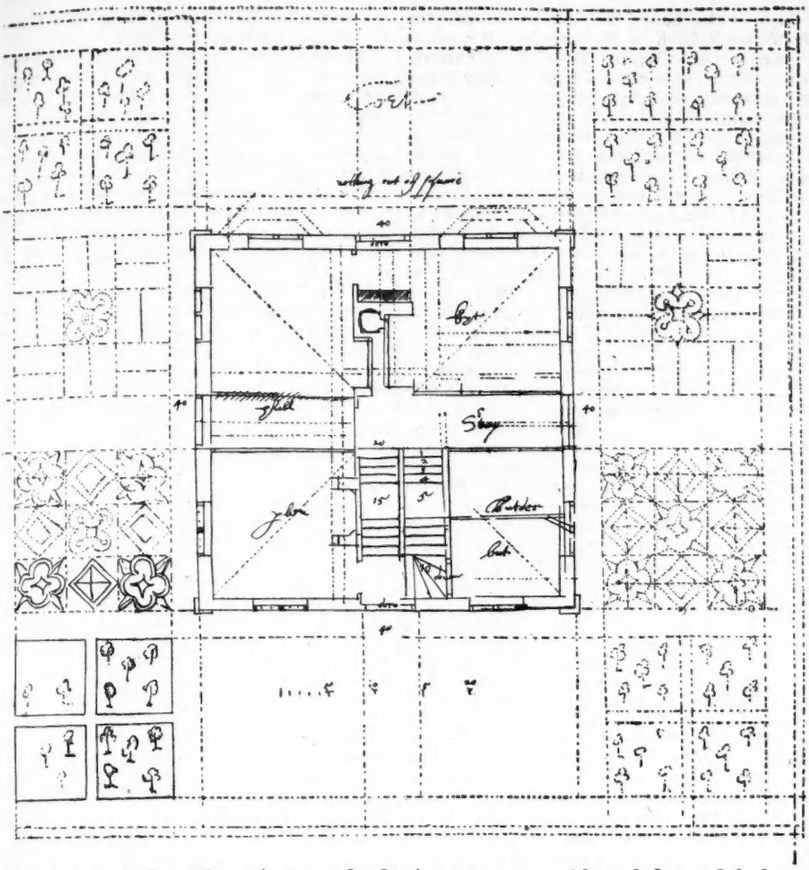


Fig. 1.—Plan by John Thorpe (not named), showing arrangement of flower-beds round the house.

after gaining the principal floor, you may sometimes see the same grand stairs sweeping away up to the empty attics.

The first room that claims our attention upstairs is the Gallery. This is a feature peculiar to the times. Every house having any pretensions to be considered a family residence had its gallery, which was always as long as the house would by any means allow. Not infrequently the house was planned with the express purpose of obtaining a very long gallery, and there were many houses where it was as much as 180 ft. or 200 ft. long. It almost invariably occupied the whole of one flank of the house, thereby obtaining light down one long side, and at the two ends. The next important room was the "Great Chamber," which seems to have been a particularly large bedroom. The rest of the floor was taken up with bedchambers, or "lodgings," as they were designated.

All these rooms, as well as the parlours, were either panelled with wood, or else hung with tapestry, setting forth with singular impartiality legends from the Bible, heathen mythology, and ancient history. The following, for instance, are taken from a contemporary list:—Storie of Susanna, the prodigal child, Saul, Tobie, Hercules, Lady Fame, hawking and hunting, Jezabell, Judith and Holofernes, David, Abraham, Hippolitus, Alexander the Great, Jacob, and so forth; a curious medley of subjects sacred and profane. When Borachio was holding that discourse with Conrade on the Fashion, which led to their arrest by the doughty Dogberry, he talked of the "Hercules in the smirched, worm-eaten tapestry." And Spenser describes the walls of Busyrane as being covered with the conquests of naughty little Dan Cupid; and in those princely rooms he tells us:—

> "Round about the walls yclothed were
> With goodly arras of great majesty,
> Woven with gold and silke, so close and nere
> That the rich metall lurked privily
> As faining to be hidd from envious eye:
> Yet here, and there, and everywhere, unwares
> It shewed itselfe, and shone unwillingly;
> Like a discoloured snake, whose hidden snares
> Through the greene gras his long bright burnisht back declares."

It was behind such arras that Polonius rashly concealed himself to overhear Hamlet's interview with his mother, and paid for his indiscretion with his life. And it was behind similar hangings, but of a humbler kind, that Falstaff fell asleep when he took his ease in his inn, and thereby gave Prince Hal an opportunity of picking his pocket of the tavern bill which showed how he had swallowed but a ha'porth of bread to such an intolerable deal of sack.

These hangings were carried from place to place when the family removed from one of their houses to another. In Beaumont and Fletcher's "Wit without Money," a great lady determines suddenly to leave town for her country house. The whole household is thrown into confusion: Ralph calls to Roger to help down with the hangings; Roger cannot go because he is packing the trunks; Humphrey is looking after my lady's wardrobe, and must, perforce, leave to some one else the task of getting down the boxes in the gallery and the coach cushions. The fact is the men, one and all, detest the idea of leaving the pleasant town for the dull country. The carts come, but there is no one to load them; the stuff lies in the hall, the plate is all packed, and above the bustle is heard the voice of my lady's sister, wanting her hat, her fan, and her cloak laid out in readiness; she begs Walter to tuck her little box up behind the coach; to see that the coachman carries her dog carefully, and that Oliver packs her looking-glass discreetly, and is careful that her curls travel well. But suddenly the order for departure is countermanded, my lady has changed her mind, and all the bustle subsides into contented quiet.

From this busy scene of a seventeenth-century household, let us turn to another and more peaceful picture, drawn by the hand of Shakspeare. The scene is a bedchamber: in a great oak bedstead with panelled head and a tester supported by huge and bulbous posts, lies the sweet Imogen, reading by the light of a taper in a book of classic mythology. On the rush-strewn floor, at a little distance, is a great trunk, where the villanous Iachimo lies concealed. He himself afterwards described the chamber to Imogen's poor credulous husband, when boasting of a conquest he never made:—

> "Her bedchamber was hang'd
> With tapestry of silk and silver; the story,
> Proud Cleopatra, when she met her Roman.
> . . . . . The chimney
> Is south the chamber; and the chimneypiece
> Chaste Dian bathing; never saw I figures
> So likely to report themselves. . . . .
> The roof o' the chamber
> With golden cherubims is fretted. Her andirons
> (I had forgot them) were two winking Cupids
> Of silver, each on one foot standing."

The picture is truly drawn: the great chamber with its fretted ceiling, its tapestried walls, its carved chimney-piece, and the winking Cupids of andirons; the beautiful lady reading in bed, and presently the stealthy Iachimo creeping from his trunk and making his infernal notes.

Reading in bed was a practice not infrequently indulged in even in those days. In an old hall in Worcestershire is still to be seen a sixteenth-century bedstead, with a head formed of panelling with wide ledges. On the panels are painted allegorical pictures, now difficult to define, and more difficult to understand. In this bed some seventeenth-century person had lain awake to read, and for the better deciphering of his text had lodged his candle on one of the broad ledges. Perhaps the book was dull, perhaps a long day in the open air had wearied him, but he seems to have fallen asleep once upon a time, and to have suffered his candle to fall down and set fire to the wood, for there the charred ledges are, and there a poor scorched allegory.

We have now looked through the inside of the house: we have seen the great hall, we have been through the kitchen, and have looked into the stone ovens of the pastry; we have chatted with the butler amid the good things of the buttery; we have passed through the panelled parlours hung with family portraits; we have ascended the broad stairs and traversed the long gallery; we have examined the tapestry of the bedrooms and the great oak beadsteads. Let us now go out of doors and look at the gardens.

In front of the house is the court through which we first entered. It is partly enclosed by the projecting wings of the house, and partly by the stone balustrade, coped at a convenient height to lean upon. Flagged paths cross from one door to another, and the quarters between are of close-cropped grass, in strict accordance with Lord Bacon's instructions. "Let not the court be paved," says he, "for that striketh up a great heat in summer and much cold in winter." It was in such a court that Falstaff,—in whose company we recently entered the precincts,—inspected the ragged recruits procured for him by Justice Shallow, and finally selected the four worst, because they were not able to buy themselves off. On the kitchen side of the house is the wood-yard, with its outbuildings screening it from observation. This is an important place, for it contains the fuel for the whole household, and from it, as the song says,

> "Tom bears logs into the hall,"

wood being the principal fuel in those days, and "a sea-coal fire" a circumstance to remember things by. On a third side is the orchard, reaching quite up to the house and offering delightful facilities for a stroll. Our friend the justice appreciated this, and after a very early supper, as the custom then was, took his guest out into the garden. "Nay," says he, "you shall see mine orchard; where in an arbour, we will eat a last year's pippin of my own graffing, with a dish of carraways and so forth;—and then to bed." "'Fore God," replies Falstaff, looking across at the house glowing in the evening sun, "you have here a goodly dwelling, and a rich." "Barren, barren, barren; beggars all, beggars all, Sir John;—marry, good air,"—and so they sat themselves down in the arbour and chatted and sang till Ancient Pistol came upon them with the news of King Henry's death.

On the fourth side is the garden itself, filled with old-fashioned sweet-smelling flowers, some of which wave beneath the casements of the parlour-bay, and shake their delicate odours into the panelled room. We may read what these flowers were in the poetry of the time; we know them all to-day, and, fortunately, are getting to know them better year by year as the fashion of "bedding-out" declines. They were rosemary and rue, carnations and streaked gilliflowers, such as Perdita enumerates in the "Winter's Tale":—

> "Hot lavender, mints, savory, marjoram;
> The marigold, that goes to bed with the sun,
> And with him rises, weeping. . . . . Daffodils
> That come before the swallow dares, and take
> The winds of March with beauty; violets, dim,
> But sweeter than the lids of Juno's eyes,
> Or Cytherea's breath; pale primroses,
> That die unmarried, ere they can behold
> Bright Phœbus in his strength, a malady
> Most incident to maids; bold oxlips, and
> The crown-imperial; lilies of all kinds,
> The flower-de-luce being one!"

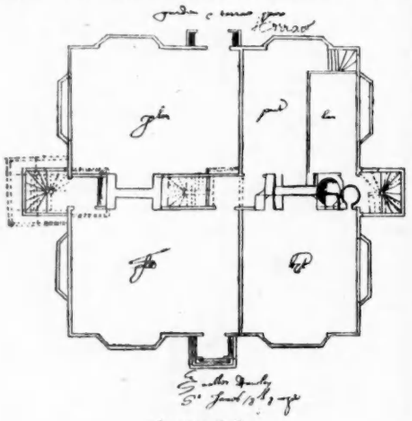
Some of these grew at their own sweet will; some were carefully disposed in geometrical

patterns in square beds with narrow walks between, forming a large and flagrant sea of dancing colour. Such formal arrangements may be seen on a few contemporary house-plans, the architect occasionally varying the prose of stone and lime with the poetry of the garden (see plan, fig. 1). Then, round the large open space thus brilliantly set, went terraces, and deep-shaded alleys, artfully contrived on a framing of carpenter's work. It was the remembrance of his garden that stirred the heart of Beaumont & Fletcher's "Noble Gentleman," when, weary of town, he cried out for the country, "where quietly," as he says,—

> "Free from the clamour of the troubled court,
> We may enjoy our own green-shadow'd walks,
> And keep a moderate diet without art."

Such was the home of a squire early in the seventeenth century. The picture is not drawn from one particular house, but some of its features may still be found in any Jacobean mansion. In such a house must have lived John Hampden. The home of Francis Tresham, who was concerned in the Gunpowder Plot, exists to this day, and is not unlike the house and garden we have just examined; the country house of Sir Walter Raleigh was another of the same kind. Now let us give a brief glance of a little town house which was to have been built in St. James's for the last-mentioned gentleman.

It is a square house, measuring only some 41 ft. each way (see plan, fig. 2). On the ground-floor it



Accommodation.
Hall.
Parlour (plor). | Larder (lar).
Pantry (pant). | Kitchen (kyt).

Fig. 2.—Plan, by John Thorpe, of a House for "Sir Walter Rawley, St. James."

is divided into four quarters occupied respectively by the hall, the parlour, the kitchen, the pantry, and larder. Of these the hall and parlour are somewhat larger than the other two quarters. The entrance is through a porch projecting from the middle of one side. There is in this case no passage leading from the porch, the door opens into the hall itself. Opposite the front door is the door of a vestibule leading to the kitchen and offices and to a staircase in the middle of the house. On the same side as this latter door is the fireplace, and beyond that another door leading to the parlour and to another staircase contained in a square turret projecting from the middle of that side of the house.

There is here, therefore, as before, the hall communicating at one end with the offices, at the other with the parlour and staircase. The kitchen (about 18 ft. by 16 ft.) has the usual large fireplace and oven, but there is no pastry and no buttery. On this side of the house there is also a projecting staircase for the use of the servants. Outside, therefore, the house is symmetrical. In the middle of each side is a projection, which in two cases contains a staircase, and in the other two is a porch (for there is a porch out of the parlour to balance the front porch, and leading into the garden). On either side of these projections is a shallow bay window, making two to each side. The hall has two bay windows, the parlour two, the kitchen two, the pantry one, and the larder one. An unnecessary number, perhaps; but, then, symmetry is symmetry. There are also four staircases in all: two on the sides, one right in the middle of the house, and a fourth in one corner of the pantry, and, probably, leading to the cellar. There is no upper plan extant, but it must have contained four bedrooms, possibly five.

Such is the house intended to be built for Sir Walter Raleigh in St. James's. For aught I know, it was built; but, if so, it has entirely disappeared. It is a small unpretending place, and contrasts strongly with some of the enormous palaces built by other favourites of the queen, such as Burleigh House, Kirby Hall, or Theobalds. Let us take, for instance, Buckhurst House, in Sussex, now destroyed, but which was once the home of the Earl of Dorset, who was first a poet and then a statesman; in his youth, the author of the first English tragedy; in his mature years the trusted successor of the great Lord Burleigh in the supreme office of Lord High Treasurer.

This is a vast block of buildings, enclosing one large central court and three side courts for light and air. (See the plan at the top of the page of lithographed plans. It is that of Buckhurst House in Sussex, now destroyed.*) You enter through a great archway, on each side of which is the porter's lodge. You are then in the central court, which is about 105 ft. square, and would itself hold four houses of the size of Sir Walter Raleigh's. Advancing across this court, you ascend an easy flight of steps on to a terrace, and so through a porch into the usual passage cut off from the main hall by the wood screen. Here the arrangement is such as has already been described. To the right is the hall, with its daïs and bay window; to the left is the buttery, and beyond it are the servants' offices. The buttery is on a larger scale than we have yet seen. It contains not only the buttery, but also "butler's lodging" (or bedroom), and a "breakfast-room." Beyond this is the pantry and the "pantler's lodging." The other servants' offices comprise the kitchen, dry and wet larders, scullery, bolting-house, a place for pewter, and another for trenchers, a "privy bakehouse," and also a surveying place. These surround a small court, and on one side face the woodyard, with its bakehouse, brewhouse, &c. The rest of the house is devoted to the family. Returning to the hall, and going out at the other end, you come to the "chapel," the great staircase, "a wayter's chamber," the parlour with the great chamber above, the "withdrawing chamber," and several suites of apartments, each called "a nobleman's lodging." Such a suite contains, in one instance, his "antecamera," "bedchamber," "servants' lodging," and a room between for "wood, cole, and privy." There is also a tennis-court, 65 ft. long, and upstairs a gallery, 16 ft. wide, and no less than 250 ft. long.

This list of apartments at once marks a house of greater magnitude and pretensions than the squire's house we recently visited. Its grandeur is further emphasised by the fact that the range of buildings on one side of the entrance gateway is called "for my lord's side," and those on the other "for my lady's side." Every arrangement goes to help magnificence and stately display. Such houses frequently had to accommodate royalty itself, with all its enormous retinue, and they were built not only of a size sufficient to do this, but also to do it in a stately and magnificent fashion. It was such a house as this that Spenser had in view when he described his "stately pallace built of squarèd brick," wherein

> "High lifted up were many loftie towres,
> And goodly galleries far over laid,
> Full of faire windows and delightful lowres;
> And on the top a diall told the timely houres."

The gardens of such palaces were in keeping with the buildings themselves. Thirty acres is the amount of ground assigned by Lord Bacon as necessary for a nobleman's place, the larger part of which is to be devoted to what is called a desert or heath. The rest is to be occupied by terraces, covered walks, open spaces of grass, lofty mounds with a banqueting-house on the top, and other imposing features, of all which some relics remain to this day in various parts of the country. Here, it is a terrace; there, a walk covered with arching yew, thick-set and cut into fantastic shapes; in another place, a great mound, now overgrown with forest trees and left to the undisputed occupation of a tribe of rabbits. It was amid such surroundings as this that the unhappy Charles I. lived when detained by the order of Parliament at Holdenby in Northamptonshire, and it was on the bowling greens of the neighbouring houses of Althorp and Boughton that the melancholy king found his chief solace till the morning when Cornet Joyce came and took him away.

We have now completed our allotted task. We have looked at men and women of the seventeenth century, as drawn for us by contemporary hands, and living in their own fair homes or wandering through their stately pleasure gardens; but, before we take leave of the grey gables, the lofty chimneys, and the many-paned windows looking out into sunlit courts, let us look at the houses we have been through, not as occupied by those who built them but by the builders' descendants in the nineteenth century.

It can hardly be denied that there is an absence of comfort in most houses of that period. The accommodation is in excess of what is required now, and it is badly arranged. There is no scientific planning at all. Convenience, economy, sanitation are hardly studied in the least. Many of the rooms are thoroughfare rooms, or, if not, they are connected by long corridors, not infrequently dark. The hall, the dining-room, the withdrawing-room, and the bedrooms are often terribly scattered, rendering it necessary to take quite a long walk before one can get to the breakfast table. Nothing is more common in these old houses than to see new corridors, which have had to be added in order to go from one side of the house to the other without either making the tour of the rooms or going out of doors. Economy seems to have been almost unknown. The amount of outside wall to some comparatively small houses is astonishing. The waste of space in passages and staircases is something shocking. Sanitation was less heeded than it had been two centuries earlier. Such remains of the latrines of fortified places of the fourteenth century as have come down to us show that ventilation and isolation were carefully attended to. In Jacobean houses they are hardly thought of. An outside wall is chosen when convenient, but otherwise any small spare space is considered good enough, whether it open from a passage, a bedroom, or even a parlour. One house was planned with a common vault, destined to receive all the drainage, placed right in the centre, and from the well thus formed several windows received light and air.

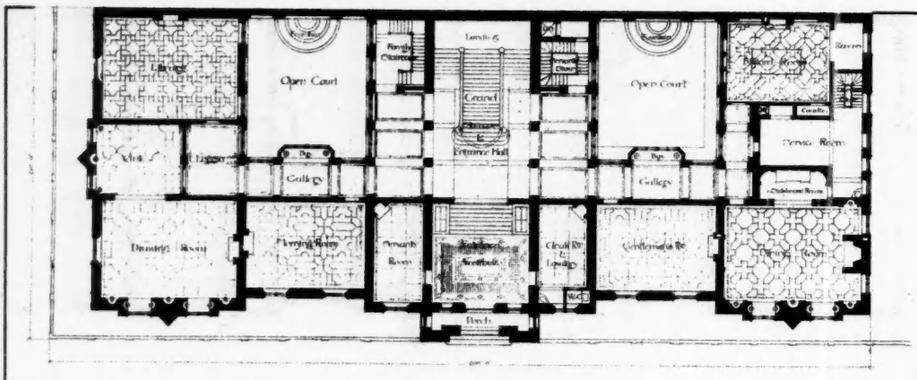
The one department that did receive some care was the kitchen with its neighbouring offices. These are always arranged with a certain degree of attention, and their communication with the hall is generally well contrived. But with this ends, as a rule, the commendation which can be bestowed on the planning of seventeenth-century homes judged by the standard of the skilful planner of to-day.

But let us not complain; we may well leave that to those fortunate people who live in historic halls, and will gladly help them in their endeavours to solve the problem of reducing a seventeenth-century house to terms of the nineteenth century; while, as mere lovers of the picturesque, we cannot but feel that if the houses are straggling they give us long stretches of roof, quaint gables, innumerable chimney stacks, and delightful expanses of lichen-covered wall; and we can cordially echo the remark of Falstaff to his friend the Justice, "'Fore God, you have here a goodly dwelling and a rich."

[The paper was illustrated by a series of excellent slides from photographs, taken by Mr. J. L. Robinson, of Dublin, and Mr. J. Gale, F.R.I.B.A., and shown by means of the oxy-hydrogen lantern. These included views of Rushton, Sherborne, Montacute, Stapleford Hall, Canons Ashby, Burford, Lyveden, Knole, and Hatfield, besides several facsimiles of John Thorpe's plans for country houses.]

The Chairman congratulated Mr. Gotch on the charm of his literary style, and on the excellence of the illustrations. The lecturer was right in calling attention, at the outset, to the broad lines on which the Renaissance was framed. The contrast between the fifteenth and sixteenth centuries was a very marked one, the two epochs being essentially different, and offering contrasts at every turn. In the fifteenth century religious and scientific thought was almost nil. In England people's time was then chiefly absorbed by civil war, while in the following century the wars were principally undertaken for the extension of the empire. The more they studied history, the more they would see that the reverting towards Classic forms in architecture was part of a great movement throughout the world, and thus they would

* It should be mentioned that the plans are fac-similes (reduced) from John Thorpe's sketch-book in Sir John Soane's Museum, by the kind permission of Mr. James W. Wild, the curator.

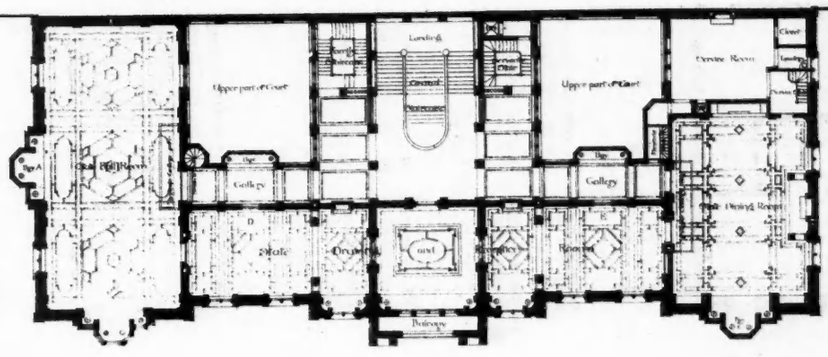


PLAN OF GROUND FLOOR
Family Apartments

C. F. Kell, Photo-Lith. & Printer.

ROYAL ACADEMY GOLD MEDAL AWARDED, 1885.

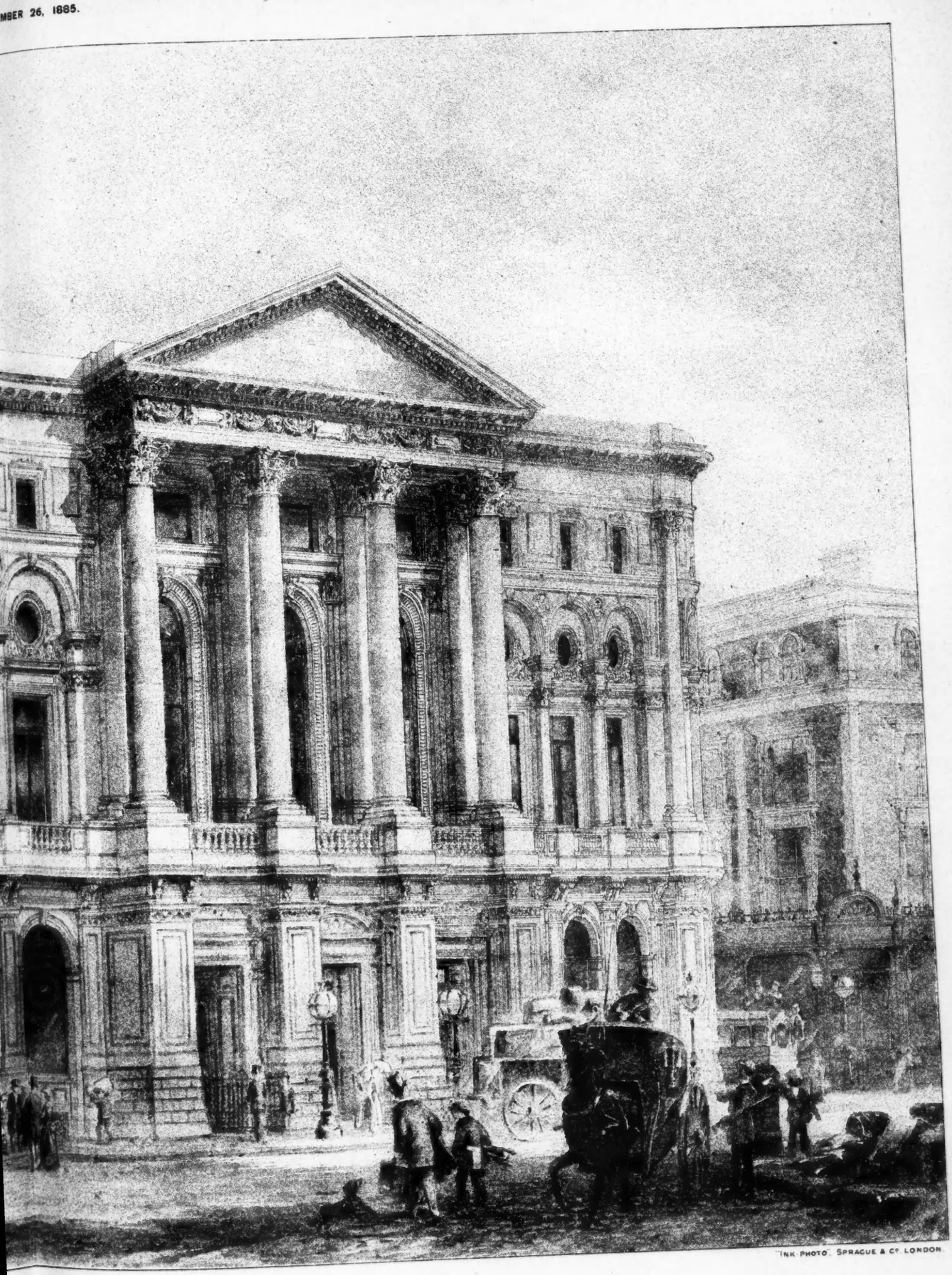
DESIGN FOR "A TOWN HOUSE," B


Upper part of Court
Gallery
Upper part of Court
Gallery
Reception Room
Drawing Room
Reception Room
Reception Room
Reception

LONDON PAVIL

Architect for Exterior and Restaurat

Architect for Interior, Mr. J. E.

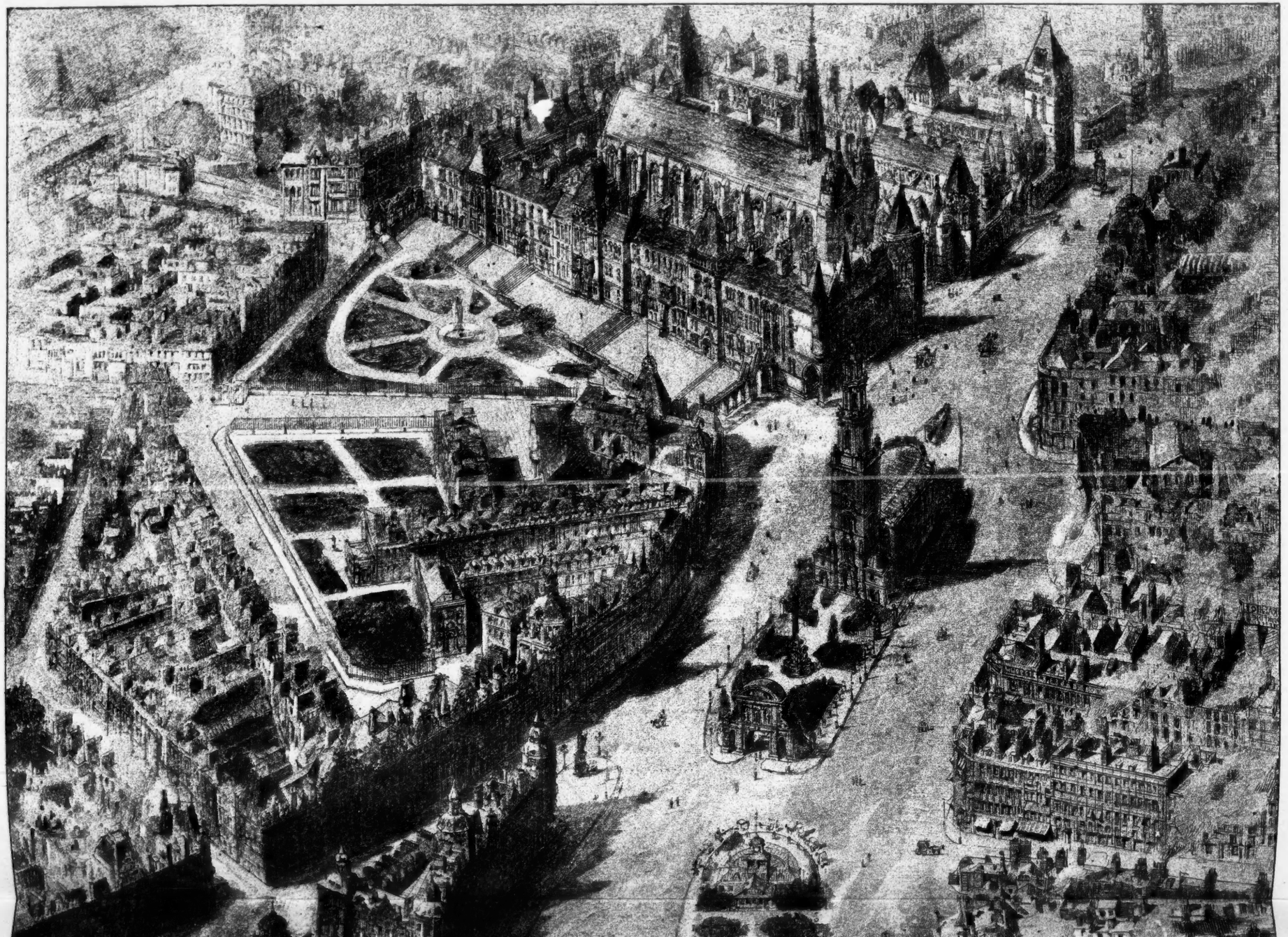


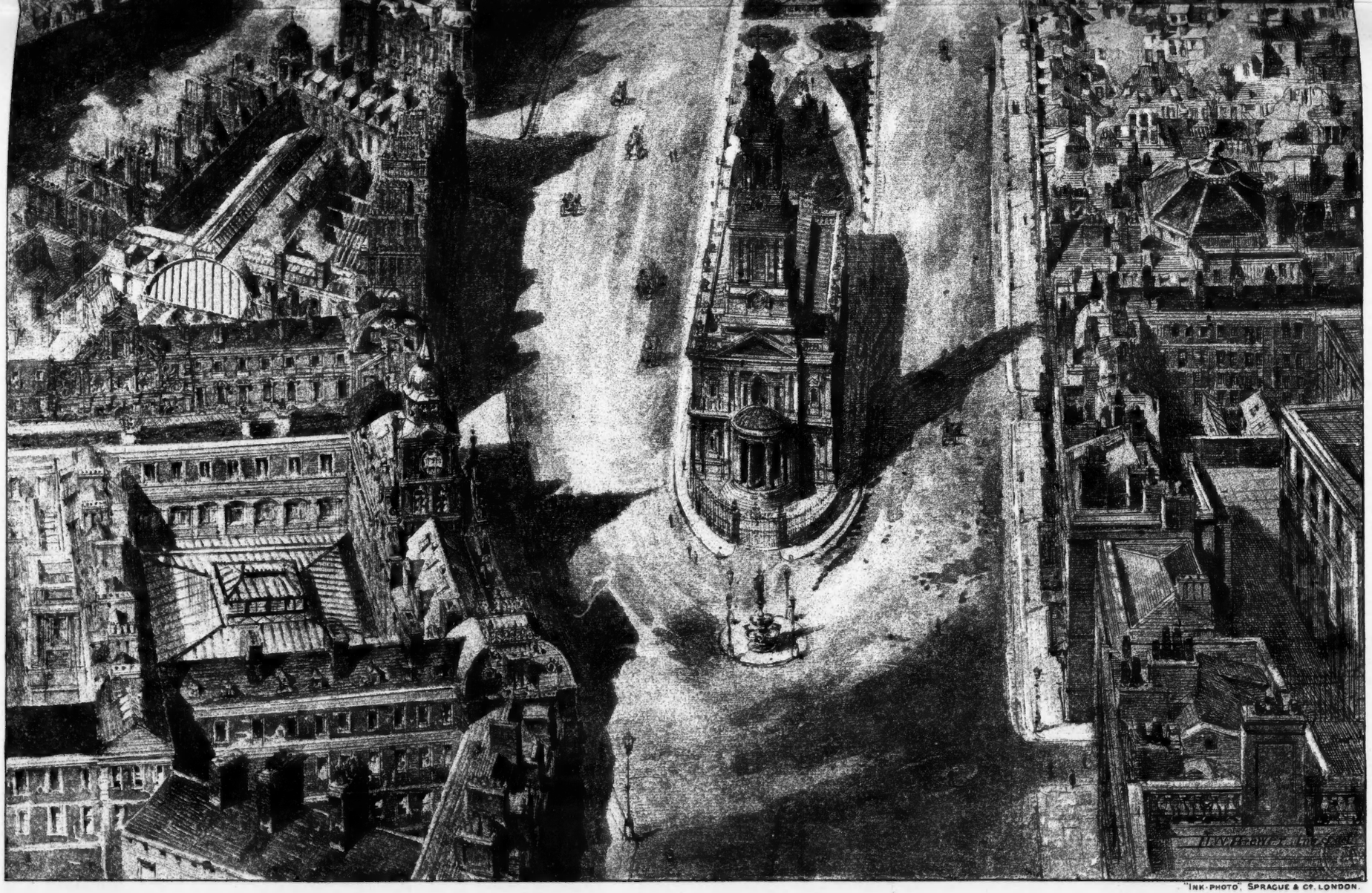
"INK PHOTO" SPRAGUE & Cº LONDON

DON PAVILION.

D RESTAURANT, MR. ROBERT J. WORLEY.

R, MR J. E. SAUNDERS, F.R.I.B.A.



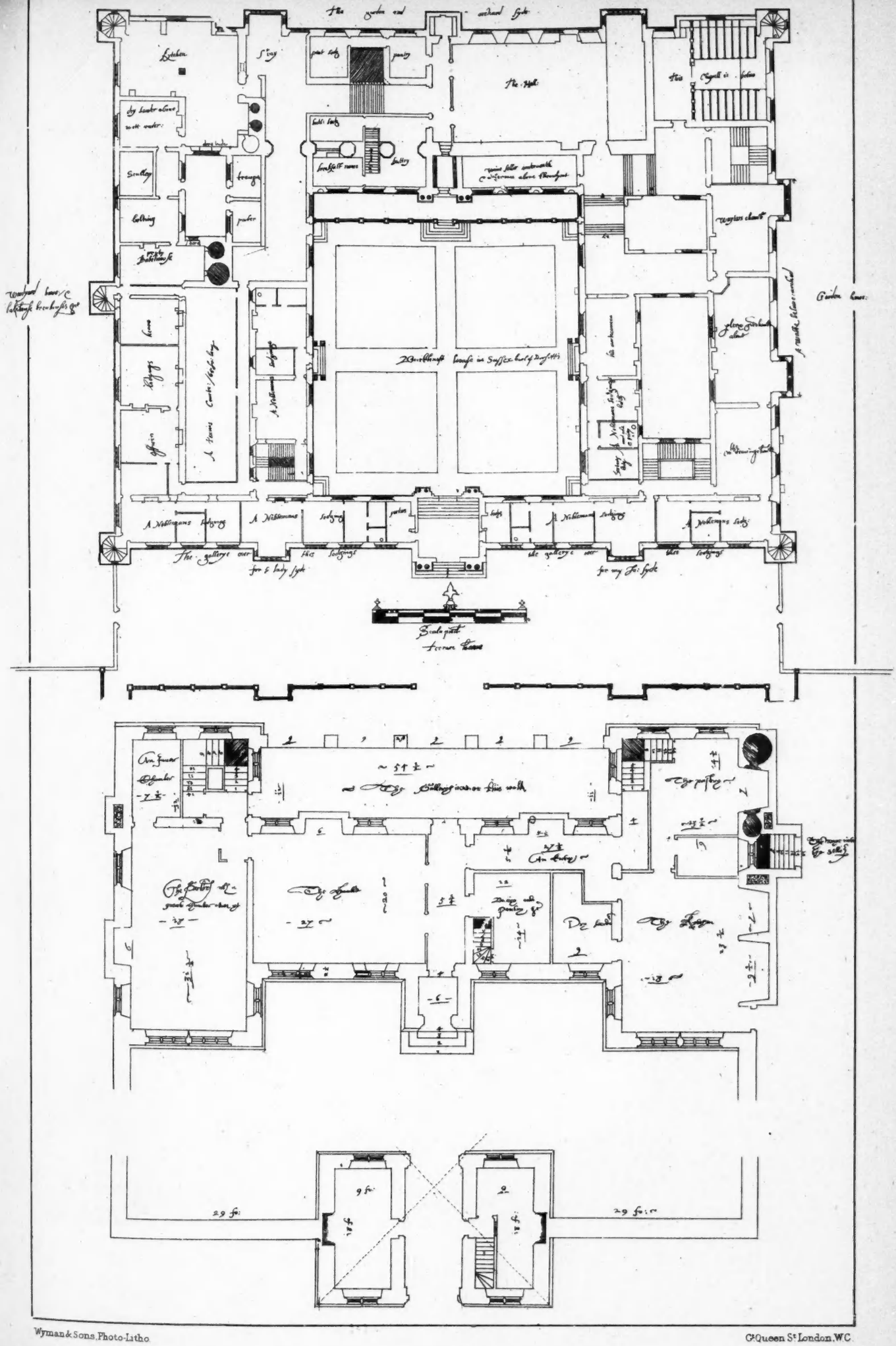


"INK-PHOTO" SPRAGUE & Cº. LONDON.

DESIGN FOR WIDENING THE STRAND.

(AS PROPOSED BY THE "STRAND IMPROVEMENT ASSOCIATION.")

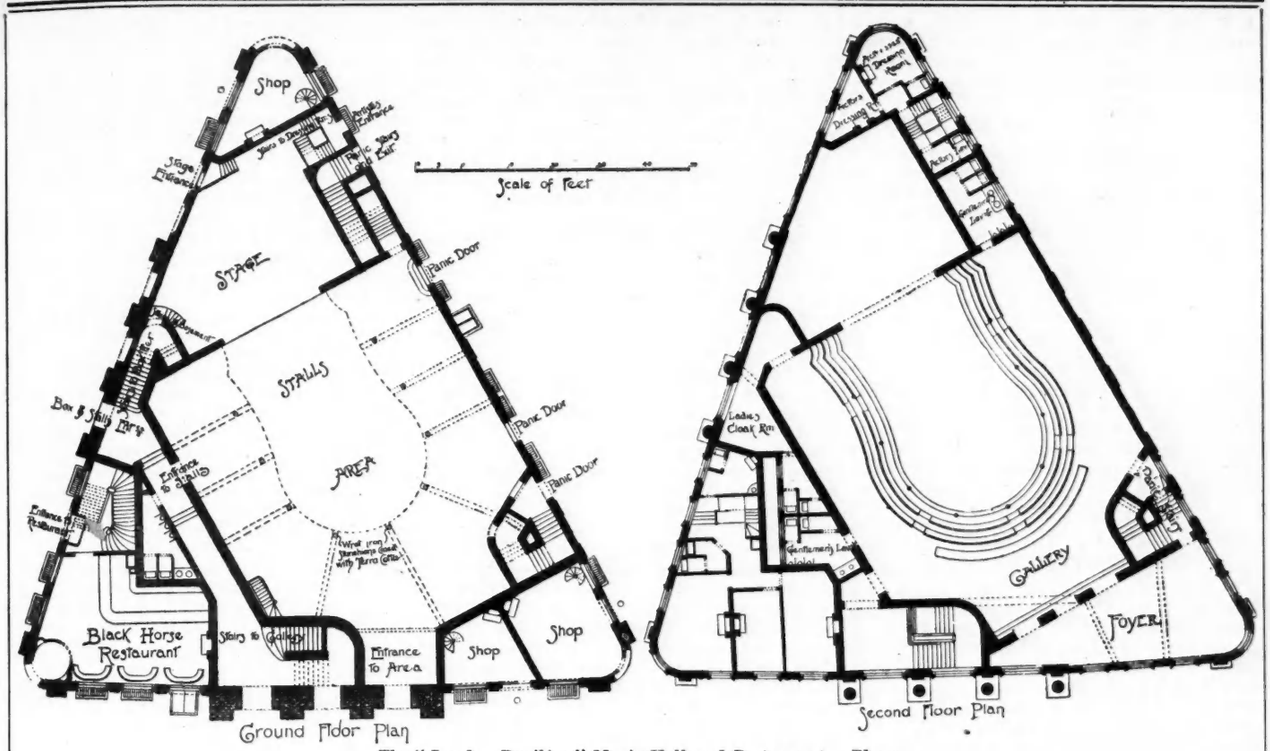
Wyman & Sons, Photo-Litho. SKETCH OF AN OLD HOUSE AT SUTTON VALENCE.—By Mr. Gerald Horsley. 6 Queen St London, W.C.



Wyman & Sons, Photo-Litho. 74 Queen St London, W.C.

TWO PLANS FROM THE SKETCH-BOOK OF JOHN THORPE, IN THE SOANE MUSEUM

Illustrating the Paper on "English Homes in the Seventeenth Century," by Mr. J. A. Gotch.



The "London Pavilion" Music Hall and Restaurant.—Plans

be able to appreciate the architectural work of the time, in connexion with the changes in literature and scientific thought. With regard to the excellent illustrations to the paper, it must have been a surprise to some of the less-travelled members to find how rich in Classic architecture England was; but to those who had, year after year, attended the architectural excursions, it was like meeting old friends to have these views thrown upon the screen. Seeing, then, the richness, variety, and beauty of English design during the sixteenth and seventeenth centuries, they must all feel, when so many minds were turned towards Italian work, that in studying it in its purity, the old English work, founded on Italian models, should not be neglected.

On the motion of Mr. S. F. Clarkson, a vote of thanks was given to the lecturer, and the proceedings terminated.

Illustrations.

DESIGN FOR A TOWN HOUSE.

THIS design, by Mr. T. Maclaren, gained for its author, as already mentioned in our columns, the Royal Academy Gold Medal for Architecture in the recent students' competition.

The design is a finished and graceful one in regard to its masonic detail, and it is a pity that this is so crushed and overpowered by the portentous pyramid of roof in the centre, which is not only architecturally disproportionate, but a very unpractical way of building, as little good use can be made of the large timber construction thus piled on the building.

Since first noticing the architectural drawings we have learned that a special instruction in regard to them was that the design and arrangement of the house should be such as to allow of the advantageous hanging of pictures. This suggestion emanated, we believe, from an eminent painter among the Academicians, whose views on the competition we have heard, and who considers that his problem is in no way met by this or any of the designs. What is wanted for the purpose is a considerable amount of unbroken wall-space with a side light and no cross lights. It will be seen that only two of the principal rooms in the plan of the present design fulfil this condition; the rest all have cross-lights. The matter is an important one from a painter's point of view, as we are assured by artists that the purchase of pictures is often prejudiced by the fact that so little of the hanging space in London houses is so lighted as to afford any reasonable chance of showing a picture to advantage.

THE LONDON PAVILION MUSIC HALL AND RESTAURANT.

THE new buildings of the "London Pavilion" Music-hall and Restaurant have been erected on the commanding site in Tichborne-street, Haymarket, formed by the construction of the new street from Regent-circus to Holborn. This site, which has frontages in Piccadilly, Great Windmill-street, and the new street of about 135 ft., 165 ft., and 155 ft. respectively, has been greatly improved by the demolition of the block of buildings at the east corner of Regent-circus, thus giving an uninterrupted view down Piccadilly and Regent-street.

The elevations up to the capping of the plinth and also the columns have been executed in Portland stone, the upper portions of the elevations in Bath stone (Westwood Ground). The carving has been done by Mr. A. Lonnie, of Portland-place North, Clapham-road, who is also executing the carving to the woodwork in the Restaurant. The iron grilles have been executed by Messrs. Brawn & Co., of Clement-street, Birmingham. The Restaurant, which is situated at the corner of Piccadilly and the new street, will consist of a buffet on the ground-floor, a public dining-room on the first floor, private dining-rooms on the second floor, and kitchens, &c., on the third floor.

The buffet is 17 ft. high and the dining-room 22 ft. 6 in. The latter will have a gallery running round two sides. The upper portions of these rooms, including the ceilings and also the upper portions of the staircase, will be finished in canvas plastering by the Frame-makers' Association, of Red Lion-square, Holborn. The buffet and dining-room are to be panelled in walnut. The walls of staircase are finished with marble and tiles. The marble-work was executed by Messrs. Houghton, of Great Portland-street; and the wall tiling by Messrs. Doulton & Co., of Lambeth. Messrs. Ebner have the mosaic paving and parquet flooring to the buffet and dining-room, &c., in hand. Messrs. Goddard & Co., of High-street, Peckham, are fitting up the building with lifts. The whole of the public portion of the Restaurant and the Music-hall has been fitted up with electric light on the incandescent principle by Mr. Cannon, of London-road.

The elevations of the entire block and interior of the Restaurant are from the designs of Mr. Robert J. Worley, of Cannon-street, Mr. Ebenezer Saunders, of Finsbury-circus, being the architect for the interior of the music-hall.

Great credit is due to Messrs. Peto, the contractors for the buildings, for the rapidity with which they have carried out their contract, which was signed on March 2nd, 1885.

The last performance in the old hall took place on the evening of March 26th last, and Messrs. Peto then obtained entire possession of the site (which was covered with buildings) on April 5th, the first brick being laid on May 11th and the first stone on May 18th. The work has proceeded continuously both night and day with the exception of Sundays. The Pavilion was completed for the inspection of the Magistrates on September 25th. It may be interesting to know that the following materials were used in the construction:—About one million and a half bricks, which were laid at the rate of about 40,000 a day; 5,500 ft. cube of Portland stone and 35,000 ft. cube of Bath stone; 60 tons of lead, 90,000 ft. cube of timber, and 1,600 square yards of the Doulton-Peto fireclay flooring (of which we gave a section showing the construction in our last number, p. 877). The use of this latter enabled the contractors to strike the centreing directly the flooring was fixed, and to proceed with the plastering at once; 350 men were employed on the building during the day and 150 at night.

The building was completed in four months and seven days after the first stone was laid.

DESIGN FOR WIDENING THE STRAND.

WE mentioned a little while ago the fact that a deputation from the "Strand Improvement Association" had waited upon the Metropolitan Board of Works in regard to the desirability of doing something without further delay towards increasing the accommodation for traffic in the portion of the Strand between Somerset House and the Law Courts. The illustration we publish, in the corner of which may be read the signature of a well-known architectural artist to whose advice we may presume the Association are indebted, represents a scheme put forth by the Strand Improvement Association for obtaining the increased street accommodation desired without disturbing either St. Mary-le-Strand or St. Clement Danes churches, and, in fact, adding very much to the architectural effect of both churches. The scheme, as will be seen at a glance, is to acquire property to the north of the two churches, abolishing Holywell-street, driving a wide street through to the north of the churches, and leaving them and the intermediate ground as islands partly formed into gardens; Temple Bar being shown as re-erected as an entrance to one of the gardens. This use of the arch as an entry to such a very small garden is, however, rather a bit of bathos, and we prefer the destination which has already been suggested for it in our columns, viz., the eastern entrance to the Temple precinct. Apart from this detail, the scheme

is a fine, and, we venture think, a practicable one, and if carried out would probably take rank as one of the most successful and popular of London improvements.

OLD HOUSE, SUTTON VALENCE.

This picturesque house, standing near a village in Kent, with a name as picturesque as itself, is a charming example of the kind of work which has been the inspiration of much of what is expressive and pleasing in our best recent Domestic architecture. The drawing, by Mr. Gerald Horsley, was in the last Royal Academy Exhibition.

PLANS FROM JOHN THORPE'S SKETCH-BOOK.

These plans are referred to in Mr. J. Alfred Gotch's paper on "English Homes in the Seventeenth Century," read before the members of the Architectural Association on the 18th inst., and printed *in extenso* in this week's *Builder*.

THE CHURCH OF ST. BARTHOLOMEW-THE-GREAT, SMITHFIELD.

The recent excavations made under the direction of the Executive Committee for the proposed restoration of this ancient and historic church were inspected on Tuesday, the 15th inst., at a meeting held in the vestry, with Lord Charles Bruce, M.P., in the chair, to consider the report of Mr. Aston Webb, F.R.I.B.A., upon the condition and requirements of the church; the purchase of the important site of the fringe manufactory lying to the east of the apse having been recently completed, but not without borrowing upwards of 2,000*l.* to make up the sum demanded. Mr. Webb was instructed to explore this erection, which, from the highly inflammable nature of its contents and component parts, formed a source of imminent danger to the church, over the apse of which it hangs. On digging out the soil in the basement of this building, Mr. Webb has laid bare some exceedingly interesting details of the Lady-chapel, which, as far as can be made out at present, was a rectangular apartment, measuring about 60 ft. by 20 ft., running longitudinally along the axis of the church itself in a direct line with the nave and choir. This magnificent early crypt, built with a barrel vault, the ribs of which give 22 ft. segmental span, appears to be composed of rubble walls with chamfered piers standing on square bases, carrying ribs of the same chamfered style, without corbels or capitals. The crypt was lighted by three or four pairs of small windows, splayed inside, and furnished with long shafts, throwing down the light from the old level of the earth outside. The iron-work of one window still remains. The Lady-chapel, over the crypt, was entered from the ambulatory behind the apse, and the jambs of one or more entrances have been found built up into the wall which was erected in the sixteenth century to divide the church from the Lady-chapel when the latter building was converted into a Prior's house. It is probably owing to this conversion that the site became ultimately alienated from the possession of the church. A very beautiful corbel has been uncovered by the removal of the rubble on the south side of the wall. It represents a man's head wearing a flat cap, and is probably of the thirteenth century. The Lady-chapel was lighted by three windows of three lights on each side, and the remains of the jambs give 7 ft. 6 in. as their diameter. The mouldings are of the fifteenth century, and thus indicate that the chapel was rebuilt at that time; the original chapel may have been destroyed by fire, as there are traces of charred substances in the soil now being removed. On the south wall is a small niche or sedile, which may have formed part of the first chapel. Sufficient details are left to indicate the design, and there would be no difficulty in restoring the whole. The original buttresses, of which there are three on the south outside wall, are in good sound condition; but the interior is a complete mass of rotten timbers, floors, and panelling as dry as tinder, and its clearance, which has been sanctioned by the committee, will remove a fruitful source of danger to the church and schools which are incorporated with it. During the course of excavation an ancient sword, a pistol, a bellarmine of gray ware, a finely-oxidised glass bottle of the fifteenth century, a cuirass or breastplate, a fragment of Early English glazed pottery, and other relics of Mediæval antiquity, were met with, as well as several pieces of mouldings and carved stones which had been used up a second time in the later building. One stone in particular has a remarkable appearance, showing on one side the base of a twelfth-century shaft or pilaster, on the other a capital of fourteenth-century work. Professor T. Hayter Lewis, F.S.A., to whose labours the restoration works carried out in 1863 are in great measure due, laid before the meeting his views on the proposals suggested by Mr. Webb, and recommended their acceptance. Mr. Webb's report of works necessary to be carried out may be briefly stated as follows:—

1. The completion of the apse and east end, the latter of which appears to have been subject to extensive and important modifications since its first construction. These the removal of the wall blocking out the Lady-chapel from the ambulatory will more fully reveal. The last window on the north side of the clearstory shows by its curve that the clearstory was continued round the apse, and this arrangement will be carried out. Above this the second line of windows will be carried in uniformity with those at present existing in the nave (or rather the choir, as there is very little of the original nave left). This work will cost 1,800*l.*, and the Rev. F. P. Phillips, the patron, has very munificently undertaken to defray the cost of the whole of this part of the restoration, subject to the Restoration Committee clearing the site and obtaining the faculty.

2. The renewal of the roof of the church with oak, at an estimated cost of 800*l.*, is very pressing, as the present arrangements for carrying off rain are seriously defective, and it is found that a considerable quantity of water finds its way into the church and effects much harm by the dampness thereby set up. This general dampness is sensibly manifested by the smell, and the appearance of the walls, to all those who go into the church.

3. Removal of the boys' school from the north triforium and of the girls' and infants' school from the south. These works are urgent, from the constant disturbance of noises plainly heard in the church, and suitable provision could be found for the schools on the site now purchased with the fringe manufactory. The removal of the girls' school would also enable a second and very necessary entrance into the church to be made. These alterations, with removal of the blacksmith's forge, another source of danger and annoyance occupying the site of the north transept, and the rebuilding of the north and south transepts, including removal of the vestry, would necessitate an outlay estimated at 4,000*l.*

4. The reparation of the west end and the nave, including a porch on the west, would amount to about 1,000*l.*, and furniture for the interior of the church (now filled with chairs) to 800*l.* more. The repairs to the aisles and triforium would cost 1,000*l.*

5. New schools, if erected in the Lady-chapel or on the open ground to the south, would cost 2,500*l.*, and the restoration of the Lady-chapel with the crypt below 2,800*l.* if the schools were placed elsewhere.

The great value of the property, and the difficulty which would arise with regard to ancient lights, would practically preclude any attempted restoration of the transepts, beyond opening out the arches at the crossing; but even this would restore some of the original aspect to the church, besides affording additional room for seating the large parochial congregation. Extensive as these suggested repairs and restorations are, the rescue of one of the most sadly-dilapidated churches in London from secular uses and improper application of its component parts is a highly commendable act, and if proper care be taken, as we are sure it will be, by the influential committee, that the historical, architectural, and archæological character of the building is not interfered with, the recovery of these long-alienated portions and their reparation will redound with credit to all who have assisted in the saving of one of our noblest and oldest churches from disintegration and imminent decay.

Mr. E. Preston Willins, A.R.I.B.A., has been elected Diocesan Surveyor of Ecclesiastical Dilapidations for the Diocese of Norwich.

THE PRINCE OF WALES AT MESSRS. DOULTON'S POTTERIES.

The Albert Medal, annually given by the Society of Arts "for distinguished merit in promoting arts, manufactures, or commerce" was this year awarded, as our readers know, to Mr. Henry Doulton, the head of the well-known firm of Doulton & Co., of Lambeth. The medal was presented on Monday last by H.R.H. the Prince of Wales, who, in recognition of the special merit and great importance of the industries so well represented by this firm, visited the Lambeth Potteries in person in order to present the medal to Mr. Henry Doulton on his own premises and in the presence of his friends and *employés*. The ceremony took place in a large show-room in one of Messrs. Doulton's large buildings on the Albert Embankment. The room had been very appropriately decorated, under the direction of Mr. A. E. Pearce, one of the artists employed by the firm. Opposite the daïs was exhibited one of the four panels now being executed by Mr. George Tinworth on Messrs. Doulton's premises for the Bromley-Davenport Memorial. This was flanked by two figure-panels by Mr. J. Eyre, executed in Messrs. Doulton's new *impasto* ware. On his arrival the Prince of Wales was received by Sir Frederick Abel, Chairman of the Council of the Society of Arts, and the members of Messrs. Doulton's firm.

Mr. H. Doulton having been introduced to His Royal Highness by Sir. F. Abel,

The Prince of Wales said,—Ladies and gentlemen, it affords me great gratification to present, on this occasion, the Albert Medal to Mr. Henry Doulton. By the wish and with the unanimous agreement of the Council, and with my approval as having the honour of being the President of the Society of Arts, this medal has been awarded to you, Mr. Doulton, in recognition of the impulse given by you to the production of artistic pottery in this country. It would have been a pleasure to me to have handed you this medal at Marlborough House, but I felt sure that it would be more gratifying not only to yourself but also to your numerous friends and the artisans who work for you, that I should present this medal here to-day. I need hardly remind you of the history of this medal, that it is a memorial to my late lamented father, who did so much to encourage arts, manufactures, and commerce, and who for eighteen years presided over the Society of Arts. This medal was instituted twenty-two years ago, and has been awarded annually to those who for distinguished merit in promoting arts, manufactures, and commerce have been thought worthy of receiving it. From all you have done, Mr. Doulton, not only in this country but throughout all parts of the world, I do not think there is any one more deserving of the high compliment we are now about to pay you. I need hardly say that it affords me great pleasure to present to you personally the Albert Gold Medal.

Mr. Henry Doulton, in reply, said:—In receiving from your Royal Highness the Albert Medal, instituted by the Society of Arts in 1862 as a memorial of your illustrious father, the late Prince Consort, and bearing his impress, I feel that you are conferring on me a very high honour. As President of the Society of Arts, as well as in other and manifold labours for the good of the people, the Prince Consort gave an impulse to the arts and manufactures of this country which has been growing and widening ever since, and the full measure of which we can even now hardly estimate. When I recall the roll of celebrated men, both Englishmen and foreigners, who, in former years have received this distinction at your hands for "distinguished merit in promoting arts, manufactures, or commerce," it is indeed most gratifying to me to learn that the award of the Council of the Society, composed of so many men eminent in science and art, was unanimous, and that it met with the approval of your Royal Highness. But you have deepened my obligation and enhanced the value of the award immeasurably by graciously coming to Lambeth and conferring this honour upon me in the presence of my fellow-workers. For any services I may have rendered to art industry I am indebted to the able and cordial co-operation of those who have been associated with me. No man ever had more loyal coadjutors, and it is most gratifying to me that they share with me in the honours of the day. The approval of your Royal Highness will be an incentive to

future efforts. Whatever our shortcomings, we have at least striven to work in the spirit of our motto, "Le Beau est la Splendeur du Vrai." I may, perhaps, be permitted to call to the recollection of your Royal Highness that your first public act was to lay the foundation-stone of the Lambeth School of Art in this neighbourhood twenty-five years ago. In replying to the Rev. Robert Gregory (now Canon Gregory) on that occasion, your Royal Highness expressed a hearty sympathy with the undertaking, and your earnest hope that it would bring instruction in art within the reach of those who otherwise could not have obtained such advantage. That expectation has been abundantly fulfilled. The Lambeth School of Art, under the able guidance of my friend, Mr. Sparkes, has numbered among its students those who have become Royal Academicians. It has sent forth an army of workers, who, as designers in pottery, metal, glass, and other art manufactures, have had a most beneficial influence on the industries of England. In the higher education and in what are analogous to University honours, the Lambeth School has been most successful. The Royal Academy honours gained by Lambeth students from 1863 to 1885, which are traceable, include eight gold medals, forty-one silver medals, and eighteen other awards, as the Armitage prize, Landseer Scholarship, and premiums, making a total of sixty-seven awards. In the same time 100 students have been admitted. As a proof of its continued vitality I may mention that the awards of the Royal Academy to old Lambethians on the 10th of this month comprised Gold Medal, Travelling Scholarship and 200*l.*, for best Historical Painting; the same for best Sculpture; the Turner Gold Medal and 50*l.*; the Creswick Prize; and the Landseer Scholarship; besides many other prizes,—a goodly list of honours. The school has given us at the Lambeth Pottery an unfailing supply of artists and workers, among whom I may name one of whom we are all proud, my good friend George Tinworth, the exhibition of whose works two years ago at Conduit-street your Royal Highness and Her Royal Highness the Princess of Wales were graciously pleased to open. His last work,—one of four panels for the Bromley-Davenport Memorial,—is now on the wall before you. By the liberality of the City and Guilds' Institute a Technical School has been established at Kennington, which is in a flourishing state and is doing excellent service in the more technical training of students. It is really an offshoot from the Lambeth School of Art. As illustrating the continuity of English History may I, in conclusion, be permitted to remind your Royal Highness that the place in which we are now assembled is in "the Prince's Ward," or, as I prefer to call it by its old name, "the Prince's Liberty of the Parish of Lambeth," forming part of the Manor of Kennington, of which your Royal Highness is the lord. It might be called the cradle of the Princes of Wales. The arms of your Royal Highness, with the plume of feathers and your noble motto, were first assumed by one of the most illustrious and best-beloved of his race, Edward the Black Prince, who is specially associated with the Manor. Tradition says that it was in Prince's Liberty that the Black Prince gave a grand and sumptuous banquet when he returned home fresh from the honours of Crecy and Poictiers. The conquests of your Royal Highness have been on other fields, but "Peace hath her victories no less renowned than war." And in the paths of artistic and industrial progress, in international exhibitions, and in all humane enterprises for the welfare and happiness of Her Majesty's subjects throughout her vast empire, your Royal Highness has been a leader whom all good men have been proud to follow.

Mr. Edward Bryon, senior, on behalf of the *employés* of the firm, then presented the following address:—

TO HIS
ROYAL HIGHNESS THE PRINCE OF WALES,
K.G., K.T., G.C.B., K.P., G.C.S.I., G.C.M.G., P.C.

WE, the Craftsmen, Artists, and Workers employed in the various branches of Messrs. Doulton & Co.'s Lambeth Potteries, desire to express to your Royal Highness our gratification at the honour you have bestowed upon us in thus visiting our Manufactory.

To the interest you have shown in the welfare of the working community, and the efforts made by yourself, by the Princess of Wales, and by your illustrious father, to extend the influence of our national manufactures, we attribute largely the high position which the Lambeth Pottery has now attained.

We are anxious on this occasion to express a hope that we may in the future,—by the excellence of our handicraft, by the sincerity of our efforts, and by our loyalty to the Throne,—continue to merit the high honour which your Royal Highness has this day conferred upon us and our respected employer.

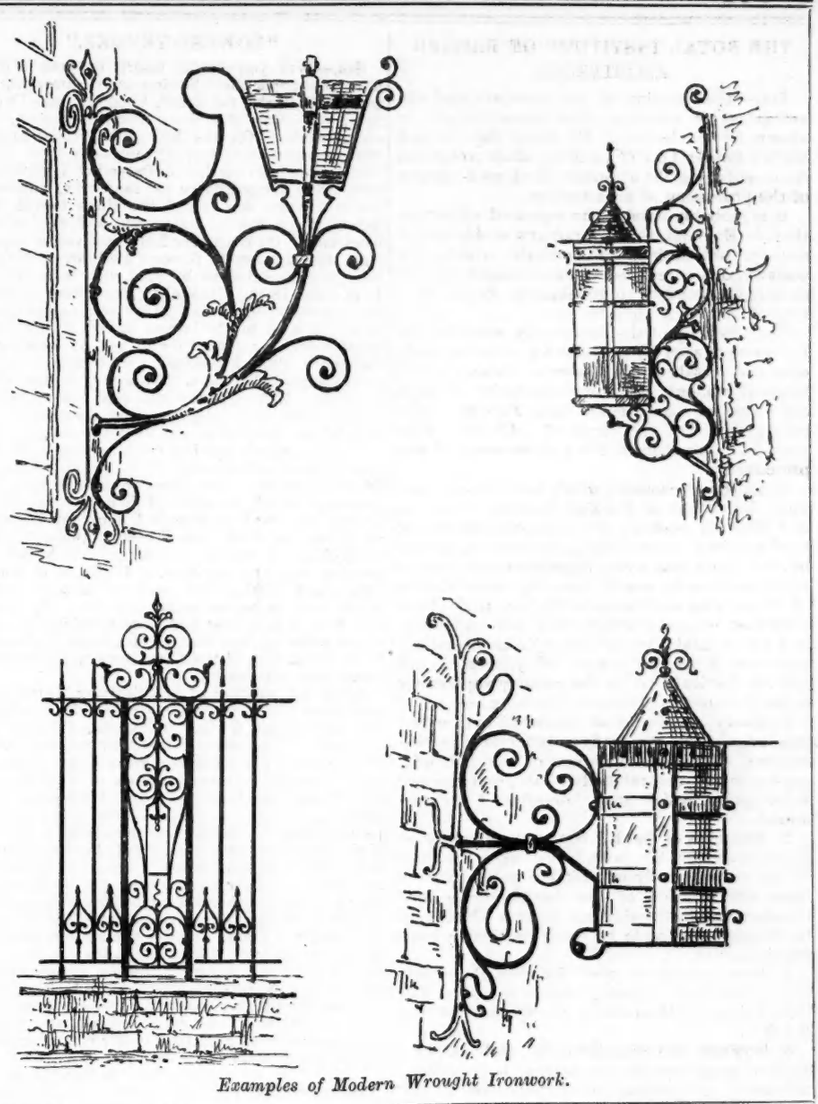
We are, your Royal Highness's most humble servants,
On behalf of the workmen employed,

EDWARD BRYON, } in the Pottery Department.
HENRY BRYON, }
JAMES RANDALL BROWN, in the Pipe Works.
J. ENRIGHT, in the Sanitary Engineering Works.
W. H. MALLEY, in the Terra-cotta Department.
GEORGE TINWORTH, } in the Art Department.
FRANK A. BUTLER, }

To this address* the Prince of Wales replied as follows:—Gentlemen, I thank you for your address, and for the kind expressions of loyalty and goodwill in which you allude to the Princess of Wales and myself. I can assure you that I am fully aware of the services that have been rendered by the firm of which Mr. Henry Doulton is the principal partner to the cause of industrial art in this country. Let me congratulate you on having at your head one who is capable of perceiving that the success of a manufacturer chiefly depends upon his securing the hearty co-operation of those who work under his direction, as I congratulate your employer on the success which he has achieved in obtaining the best and most efficient aid in carrying on the beautiful industry in which you are all engaged. I sincerely trust that the kindly relations now existing among you may never be disturbed.

His Royal Highness then left the show-room, and was conducted by Messrs. H., J. D., and H. Lewis Doulton to the art pottery, where his Royal Highness witnessed the various interesting processes by which the wares for which Messrs. Doulton are famed are produced. In the suite of rooms attached to the museum, where a large collection of specimens of the different classes of work had been arranged, the attention of the Prince was specially called to a "Commemoration" vase of Doulton ware, which had been commenced, designed, and completed within fourteen days as a memento of his visit, by Mr. Marshall, one of the artists. The room also included a number of designs in *impasto* for the Colonial Exhibition at Kensington next year, some of them of great size.

* This address, it may be mentioned, consisted of eight pages of vellum, in a cover of dark purple velvet. The address was illuminated by Mr. A. E. Pearce, the crest and arms of H.R H. being introduced, together with those of Mr. Henry Doulton and the Society of Arts. On the last page but one was a view of Messrs. Doulton's buildings from the opposite side of the river, and in the ornamental border was introduced a representation of four of the principal wares manufactured by the firm.



Examples of Modern Wrought Ironwork.

MODERN WROUGHT-IRON WORK.

WE give some further sketches of small works, lamps and railings, executed at the forge of Mr. A. Newman, some of whose larger work we illustrated in the plates in the *Builder* of December 5.

A Medal commemorative of the Erection of the New Council Chamber has just been struck by order of the Corporation of London. The medal has been designed and executed by Mr. Allan Wyon, of Regent-street, chief engraver of Her Majesty's seals, and bears on the obverse a view of the interior of the Council Chamber, which nearly fills the whole of this side of the medal. The outer segments are occupied with the City arms, crest, and supporters, and bear the inscription, "The New Council Chamber, Guildhall, opened 2nd October, 1884." The name of the architect, Mr. Horace Jones, also appears on this side. The design of the reverse consists of an allegorical representation of the Council, and is composed of a figure symbolising the City of London, standing on a low platform in front of the civic chair, attended by Commerce and Justice, and turning towards various personages typical of learning, liberality, and liberty.—*Times.*

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

Sir,—The position of our Institute and the extent of its representative character are, as shown by the letter of Mr. Knightley, in last week's *Builder* [p. 877], and by other prominent signs, engaging the attention of all well-wishers of the profession of architecture.

It is probably outside the region of argument that, in England, there is not any architectural society, association, or institute, which, for position, character, and status of members, and outside recognition, approaches the Royal Institute of British Architects.

The elasticity of the draft of the new Charter (as we have seen it) provides for throwing wide open the portals of the Institute to every architectural student, and for encouraging a large accession of Associates and Fellows, thus recognising that the terms of a Charter, fifty years old, do not meet the requirements of the present day.

In all the discussions which have taken place upon the subject of the new Charter, the needs and peculiar position of provincial architects have received consideration, and it is a matter beyond doubt that a very large increase of power to do good would result from the consolidation of all outlying architectural bodies in England with that central society which has embraced, and does contain, in the roll of its members, the best men of the profession. Why, then, should not the Institute go to the country supporting a policy something like the following?—

1. Every architectural student, and every man engaged in the study or practice of architecture, to become members of the R.I.B.A., paying to the central body that proportionate subscription which may hereafter be determined.

2. Branches of the R.I.B.A. to be established throughout the kingdom, based upon the lines of the central body when it has gained vigour from the infusion of the health-giving new Charter, and possessing all powers which may be deemed desirable to meet particular local requirements.

3. Each branch to elect its own President, that President thereby becoming, for the time being, a Member of the Council of the R.I.B.A.

4. Towards the establishment and maintenance of each branch, the central body to contribute in proportion to the strength of the branch: thus would be returned, in part, the subscriptions paid to such central body.

5. The accession of wealth and power thus obtained warranting it, to erect in London a new Architectural Academy, designed to meet the needs of technical education and examination, and, towards this, obtain state aid.

6. Let the Royal Academy (which treats architects so scurvily) be left to its painters, and provide in the new Architectural Academy for the annual exhibition of architect's works and of the studies of the students and prize winners.

7. The art of the sculptor being closely woven with that of the architect, invite sculptors to join the R.I.B.A., they paying such subscription as may be determined, and, in the new academy, provide rooms for the studies of sculptors, and for the annual exhibition of their studies and works, with those of the architects.

Thus, upon some such lines as those above indicated, might be created one powerful and completely representative body, dignified, standing out as a society, absence from the roll of which would carry with it the imputation of absence of professional aptitude or of professional rectitude.

Wm. Woodward.

Birmingham.—A large piece of building land, situated in Heath-street, Dudley-road, in this town, and having a frontage of about 900 ft., has been leased by the Birmingham Canal Company to a local gentleman for the purpose of erecting "Artisans' Dwellings" and corner shops. The total number to be erected will be about fifty,—a portion of this number being already in progress. These buildings will be of very convenient arrangement and substantial character,—a good-sized parlour, living-room and kitchen, bedrooms, attic, cellar, well-paved yard, &c., being given to each house and shop. The front elevation will be three stories in height, of an Early Gothic character. The cost of erection will be about 10,000*l*. The builder is Mr. E. Airey, and the architect Mr. J. Statham Davis, both of Birmingham.

"LOWEST TENDER."

Sir,—Will you kindly insert in your widely-circulated paper the following facts concerning the tender for works for Ilford, Chadwell, and Dagenham, consisting of sewers, manholes, roads, and outfall works? On the 30th of November tenders were sent in to the Sanitary Authority of the Romford Union. On the 1st of December I received a letter from the engineers for the works, informing me my tender was one of the three lowest, and asking for names of references, and also of my bondsmen. On December 2nd I received a request from the engineers to forward to Ilford samples of each pipe intended to be used, viz., 9 in., 12 in., 15 in., and 18 in. December 7th, I was informed my tender was not the actual lowest; inquiries were being made as to the lowest tender, and if found satisfactory, my tender would not be considered. December 10th, I received a telegram to attend at the engineer's offices, Doncaster, on the 12th. December 11th a letter was sent me confirming the previous day's telegram, and also requesting my priced quantities, and that the sample pipes had not arrived, causing me to convey a 15-inch pipe with me to Doncaster. I learned my references were satisfactory; my prices were gone into, and questions asked, in which I hope I succeeded in proving to these gentlemen I knew my business. On December 15th, the Sanitary Authority met to decide. I was in attendance, and before the meeting saw the engineer. I offered in lieu of 500*l*. bond 1,000*l*. bond, and to execute 1,000*l*. worth of work before asking for cash. My reason was that I had heard of certain influence which might make against me. I also knew my tender to be the lowest of the three lowest, as the actual lowest had withdrawn.

After the meeting of the Sanitary Authority I was informed by the engineer that the tender of Messrs. Cooke & Co., Battersea, was the one accepted. The tender of this firm was about 100*l*. above mine. For seventeen years I have been engaged in works in many counties of England, and during that time I am glad to say I have met with fairness, or, if my tender has been lowest and rejected, some explanation and consideration for loss in cash and time have been given. For the engineer to the Romford Authorities I have not a word of complaint; but for the gentlemen composing that Board I wish they had the days of toil and expenses to bear in working up a tender for 9,488*l*. 6s. 4d.: they would, I think, consider the labours of others from a far different standpoint to the one on which they decided this contract. Surely, sir, something can be done by the contractors of the United Kingdom in forming an association to guard against their capital and time being wasted, and obtain some guarantee of good faith before venturing on a straw, as now is too often the case.

J. Greenwood.

December 21st, 1885.

FELT ROOFING.

Sir,—In reply to your correspondent "F." [p. 878, *ante*] it will probably be twenty years or more before the smell of the tar will disappear. It will cease when the pores of the felt, and the cracks in jointing are so filled by the dust that the air will no longer pass through, carrying with it the volatile tar vapours.

The remedy till then is to make the air pass *outwards* through the boarding, the felt, and the slates, instead of, as now, *inwards* through the slates, the felt, and the boarding to supply the place of the air passing up the chimney.

Close the chimney as an outlet for the air of the room, except that passing through the fire of an air-heating stove. Feed the air-chambers from the outside of the house, the air forced in will then pass outwards through the crevices of doors, windows, and roof. A large stove, with a low temperature, would be the most effectual.

A. Stewart Harrison.

Sir,—I observe a letter in your issue of the 19th inst. regarding the smell arising from felt roofing upon a library roof. I am inclined to think your correspondent would find that some Willesden paper laid on the underside of the rafters would stop the odour coming through, but it would be rather a troublesome job, as no doubt he has a plaster ceiling up. I have found that for underlining slates this paper answers extremely well, and it is absolutely without scent of any kind.

Howard G. Tozer.

ENGLISH DESIGNS FOR PAPER-HANGINGS.

Sir,—In your notice of the proceedings connected with the distribution of prizes at the West London School of Art [p. 857, *ante*], there is a little mistake which I trust you will permit me to correct. I am reported to have said that for seven years I had bought "the whole" of my designs from past or present students in the school, but I really said that "a considerable proportion" of the designs I bought emanated from students of that school. I value the school very highly, and I greatly appreciate the high class of work done by many of its students; but to allow the error to stand without correction would be a grave injustice to those architects and artists trained in other schools, whose admirable works,—many of which must be well known to you and your readers through the medium of the Great International and other Exhibitions,—it has been my privilege to produce.

F. Aumonier.

110, *High-street, near Manchester-square, W.*

CHURCH-BUILDING NEWS.

Ashton-upon-Mersey. — The Church of St. Martin, Ashton-upon-Mersey, has been re-opened, after having been closed for nearly twelve months for renovation. The present structure (which replaced a thirteenth-century building) was commenced in the reign of Queen Anne, and finished in that of George III., the stone being brought from Lymm, and the wood from Peover. In 1716 the west gallery was added, and the church re-seated throughout with the wood which now adorns the chancel. The original idea of the present alterations was to re-seat the church and build an organ-chamber and vestries; but when this work was commenced it was found that the church was very much dilapidated, and a great deal of the plaster had to be removed to get at the decayed timber. In doing so a considerable quantity of the stone was bared, and then it was resolved to strip all the walls in the interior. The whole of the church has been re-seated, and the chancel and sanctuary laid in oak parquetry. The frame-work of the old pews has been carefully taken to pieces and used for panelling the chancel from floor to ceiling. The architect for the renovation was Mr. F. H. Oldham, of Manchester, and the builder was Mr. Webster, of Sale.

Bardwell (*Suffolk*).—In the month of May last, the tower of Bardwell Church was struck by lightning. Through the exertions of the rector, the Rev. A. P. Dunlap, and the assistance of the two churchwardens, a sufficient sum of money was raised to enable them to put the tower into a fair state of repair. Two new windows were placed in the belfry, and it is to be regretted that the funds did not allow of the third one being replaced, which is required. The dressings consist of Box Ground stone, the old stone, which was Clunch, being put aside. The filling-in consists of flint stones, and the windows already alluded to are worked out of Corsham. No scaffolding was used during the repairs. A timber-frame was erected on the top of the tower, from which was lowered or raised, when required, a large wooden cage, suspended by ropes, worked by means of a hand-crab from the ground, the heavy expense of scaffolding being thereby saved. Between 200*l*. and 300*l*. has been expended. Mr. Summerville was the consulting architect; Mr. H. Middleditch, Bardwell, the contractor; and Mr. A. H. Hanchet, Bury St. Edmund's, the mason.

Sewage Pumping Machinery.—Messrs. Hayward Tyler & Co., of Whitecross-street, E.C., have been busy of late upon sewage pumping machinery for various sanitary authorities. During the past few days they have successfully started the new pumping-engine designed and erected by them for the Twickenham Local Board, under the superintendence of Mr. Ramsay, the Board's engineer. This engine is of the horizontal type, calculated to raise one million gallons of sewage matter per day to a height of 55 ft. There are already two large pumping-engines by the same firm at work at the Twickenham Sewage Station, raising 1½ million gallons daily. For the Corporation of Luton (Bedfordshire) the same firm are now building a pair of pumping-engines to raise 1½ million gallons of sewage matter to a height of 200 ft. through 2,000 ft. of main. The arrangement of these engines is similar to the one just started at Twickenham. Messrs. Hayward Tyler & Co. have also lately supplied two direct-acting steam-pumps for the Walthamstow Sewage Works, each to raise 100,000 gallons of sewage or sludge per day. These pumps are of a special design, similar to that made two years ago for the Leyton Sewage Works.

Trade Smoking Concert.—Last Saturday evening the clerks in the employ of Messrs. W. Brass & Son, the well-known builders and contractors, of 47, Old-street, gave a most successful smoking concert at the Champion Hotel, Aldersgate-street, E.C. Several gentlemen from other well-known firms were present, and a pleasant evening was spent.

The Student's Column.

DESCRIPTIVE GEOMETRY.—PART II.

XXX.

IF (fig. 229) one of the directing lines were replaced by a directing surface, Σ, to which the generators G a of the surface, S would be bound to remain tangent; the curve of contact, a, a^1, a^{11} . . . . . would be a directing line of the surface. But we do not require that curve to find the tangent plane; for, as the skew surface S touches the surface Σ in the point a, both surfaces have the same tangent plane in that point, and, therefore, any straight line of the plane tangent to the surface Σ will do as director of the *connecting paraboloïd*. We need only, therefore, produce in the tangent plane to surface Σ any line a R, and use it as a director of the hyperboloïd, as well as the two tangents, L T and M U, to the directing curves. This method of finding the tangent planes is *especially useful in winding stairs either in stone or in wood*. We shall give a practical example of its application in a conoïd circumscribed to a sphere.

There are, as we have seen, skew surfaces defined without giving three directors; in other cases, the directors may be given, but we may not be able to produce the tangents to them. In these cases (fig. 230), if the point, H, on which we desire to get the tangent plane, be placed on the generator G, we construct on each side of G a series of neighbouring generators . . . . G_3, G_2, and G^1, G^{11}. . . . . Then any plane π passing through G will cut the skew surface along a curve . . . . . a_3, a_2, a^1, a^{11}, ... which will cut the line G in a point a. The plane π contains the generator G, and also the tangent to the curve a_3, a_2, a, a^1, a^{11} in the point a; the plane π is therefore tangent to the skew surface in the point a. Repeating the same operation with two other planes, π^1 and π^{11}, we get also the points β and γ where these planes are tangent to the skew surface. Drawing any three lines, a R, β T, γ V, in the planes, π, π^1, π^{11}, we shall have three directors of a *connecting hyperboloïd*, which will allow us to find the tangent plane required.

From what we have seen above we can conclude that in skew surfaces any plane π which contains a generator G is sure to be tangent to that surface in some point of that generator, but in some special cases the point of contact may be removed at an infinite distance.

If it be required that the plane tangent to the skew surface *contain a given line* D, we shall follow the general method given fig. 162 (Sept. 19, 1885). But, if the surface is either an hyperboloïd or a paraboloïd we have a great simplification. *The tangent plane must then contain the line* D *and two generators of the skew surface which meet at the point of contact.*

Now (fig. 231), if in the last case we find the points M and M^1 where the line D penetrates the skew surface, and if we construct the two generators A and B, or A^1 and B^1, which pass through these points, the planes which contain D and A or D and B will be the tangent planes required. Moreover, the plane which contain D A will also contain B^1, for A meets B^1 somewhere; the plane D B will likewise contain A^1; and we see therefore that *the points of contact will be at the meeting of the generators* A *and* B^1 *and of* B *and* A^1.

We can conclude from the above that the problem is impossible if the line D does not meet the hyperboloïd or paraboloïd; except in certain cases where the line D is parallel to a generator, or, what is the same thing, meets the surface at an infinite distance. This occurs for the generators of the limiting cone.

If the plane tangent to a skew surface is *to be parallel to a given plane* π we use a method similar to that of fig. 162, with the difference that instead of cones from two points we have two cylinders parallel to any two lines of the plane given, and again the intersections of the lines of contact give us the points of contact of the tangent planes. But for the following two surfaces we use a shorter operation:—

For the *hyperboloïd* (fig. 223) we find the generators A and B, A^1 and B^1, which are parallel to the given plane π. The planes which contain either A and B^1 or A^1 and B are the tangent planes.

For the *paraboloïd* (fig. 225) we find the *two* generators A and B parallel to the plane π. The plane which contains A and B is parallel to the plane π and tangent to the paraboloïd in the point where A and B meet.

Important proposition for determining the surfaces of the joints in skew vaults (fig. 232).—*In every skew surface* S *all the normals* M N, M^1 N^1, M^{11} N^{11}, ... *erected on the divers points of the same generator* G *form always the surface of an hyperbolic paraboloïd.*

Let us call Σ the surface which contains all the normals, and let us revolve that surface round the generator G a quarter of a circle, so that the new position M T of any normal be at right angles with the normal itself M N. After this operation the surface Σ will not have changed its form, but yet, in its new position, every generator thereof M T, M^1 T^1, ... will be tangent to the surface S.

Now, if we take any three of the tangents to the surface S, say M T, M^1 T^1, M^{11} T^{11}, and use them as directors of a surface of which G is a generator, the surface so formed is a paraboloïd which has the same tangent planes as the surface S in three given points of the generator G. We know, according to our first proposition, that it is a connecting paraboloïd tangent to the surface S in every point of the generator G, and, therefore, every tangent such as M^{111} T^{111} is contained in that paraboloïd. This means that the surface Σ is a paraboloïd, and it remains such when it is brought back to its former position of *surface of the normals.*

EXAMPLES OF DIVERS SKEW SURFACES.

The Right Conoïd (fig. 233) in this figure has for *directing plane* the plane of the plan itself; one of its directing lines is the vertical line o z, the other is the curve a z^v k delineated on the elevation plane. The generators are therefore found by horizontal sections such as the one by the plane X. The lines o_2 b, o_3 c, o_4 d are generators of the conoïd. Observe that if the generators are prolonged beyond the vertical o z, they will form a second sheet of the conoïd. The line o z is called a line of *stricture* of the surface.

The plane P tangent to the surface of the conoïd in a given point m will be found by the help of a connecting paraboloïd, of which the tangent b t is a director, and the line o z is the other director. The line b o_2 and the line t o are evidently generators of the paraboloïd. If we cut the paraboloïd by a vertical plane passing through the point m, and parallel to the elevation, the section m p will be a generator of the second system of the paraboloïd, and, therefore, the *tangent plane is the one that contains the lines* m b *and* m p; its trace P^h is parallel to $o_2{}^h$ b^h and P^v passes through the point b.

The same connecting-paraboloïd would serve to find the plane Q tangent in any other point n of the same generator; Q^h would be also parallel to $O_2{}^h$ b^h and Q^v would pass through the point b.

Observe the elevations of the lines b t, m p, n q parallel vertical sections of the paraboloïd cross one another point ω, for they are generators of the second system of the paraboloïd, and will all touch a horizontal line which is a generator of the first system. All parallel sections of this conoïd are ellipses, which have the axis o^v z^v in common, and the sections of the paraboloïd are tangent to these ellipses; on this fact is based very simple and cheap compasses for drawing ellipses.

The conoïd circumscribed to a sphere (fig. 234) is described by a *straight line, which remains always horizontal, and slides on a given line, a l. and a sphere.* The generators will be found by sections made by horizontal planes, such as X, which cuts the line a l in the point c and the sphere along a circle; the tangents c m and c n to that circle are generators of the conoïd, and m and n are points of contact the series of which form the curve of contact along which the conoïd touches the sphere. Observe that on plan the generator m c is seen until it reaches the directing line a l when it passes behind the surface to form another sheet of the conoïd.

To *find the plane* P *tangent to the conoïd in the point* r, we produce a connecting paraboloïd which has for directors the line a l and any tangent to the sphere in the point m; such a tangent is z t, the tangent to the meridian of the sphere. The problem is then brought back to finding the two generators of the paraboloïd which pass through the point r, for they are contained in the plane P. The line c m is one of them; to find the other generator we cut the paraboloïd by a plane Q passing through the point r and parallel to the two directors a l and z t. The plane Q contains the lines r u and r y parallel to a l and z t, its trace Q^h passes, therefore, through u and y. This trace will suffice to find the intersection of the plane Q with the paraboloïd for it is a straight line a r, as we know (a is at the intersection of Q^h and l t a generator of the paraboloïd). The tangent plane P contains the lines a r and c m, its trace P^h passes through a and is parallel to c^h, m^h, its trace P^v passes through γ.

The Skew Archway (fig. 235). If you take some of the plans of old French châteaux, you will find that many of the doors and archways were skewed so that the openings should be placed more conveniently on each side of the wall. If these archways had been made cylindrical and the joints had followed the axis of the cylinder, the voussoirs of the vault would have formed in some parts very sharp angles with the faces of the wall; if the joints had been kept square with the faces of the wall, then they would have formed curves, portions of ellipses, on the inner surface of the archway. To avoid all these drawbacks the old masons used to form the surface of such archways as follows:—They drew the circular arch-opening a b on the back of the wall, which we will consider our elevation plane so that its plan a b is our ground line; then they delineated the circular arch c d on the front of the wall. The plan of the archway was then a parallelogram a b c d; through the centre, o, of that parallelogram they drew an axis o_2 o which cuts the elevation plane in o^v. They treated the bed joints of their stone work as if they had an archway of diameter c^v b to deal with, so the planes of all their joints should go through the axis. The inner surface of the archway was *not* a cylinder but a *skew* surface formed by the motion of a straight line bound to touch the axis and the circles a b and c d. On the elevation such a generator will pass through o^v as m o^v and its plan, if prolonged, will touch the axis as m^h o_2.

Now, if we want to find the plane P, tangent to the surface on a point l belonging to the generator m n, we must draw the tangents m t and n r to be used as directors of a connecting paraboloïd. A third director of that paraboloïd will be the line o_2 μ; it is parallel to the directing plane of the two other directors, and it is contained in the plane tangent to the surface of the archway in the point o_2, for the axis and the generator, o_2 m, which belong to that plane, are also two generators of the surface. If we draw a plane which contains the lines o_2 μ and the point r, its horizontal trace will be o_2 r a, and its vertical trace will be a β, parallel to o^v μ^v. This plane cuts the tangent m t in the point β, and we can conclude that the line β r γ is a generator of the paraboloïd. The section of the paraboloïd by the vertical plane X gives us the second generator, l e, required. As the plane P contains both l e and m n, its horizontal trace is P^h through o_2 and e, and its vertical trace P^v touches the point m.

If the joints of the archway are planes, they will not be in every point normal to the surface of the vault, and would present, in some parts, sharp arrisses. To prevent this the bed joints may be cut out in the shape of a paraboloïd, normal in every point of the joint, and to produce this the tangent planes have to be constructed as above.

With the exception of a few questions which we may treat hereafter, we have now completed the theoretical part of Descriptive Geometry; its applications to masonry, carpentry, joinery, metal-work, mechanical engineering, and ship-building can be found in various special treatises.

Our readers will have, no doubt, noticed that the First Part of our papers treated specially of the methods employed for delineating geometrical objects and working out problems relative to them; whereas, the Second Part treats of various geometrical lines and surfaces, and illustrates their special properties.

These articles having been written, not for a privileged minority of students with a high mathematical training, but for everybody,—workmen as well as young architects,—we have thought it wise to avoid as much as possible the usual Greek scientific terms, and have adopted some special arrangements for the purposes of demonstration only. Our system of notation has never, to our knowledge, been published before. In other treatises each point is indicated by its two projections; they will say, for instance, the point (aa^1), the line (aa^1, bb^1), in

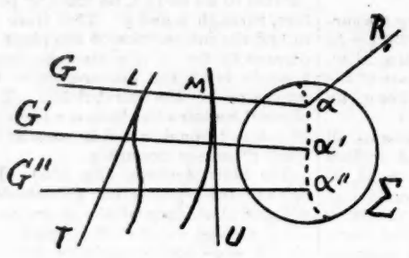


Fig. 229.

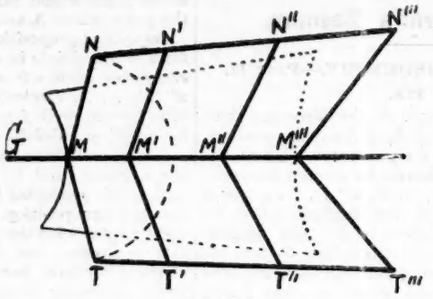


Fig. 232.

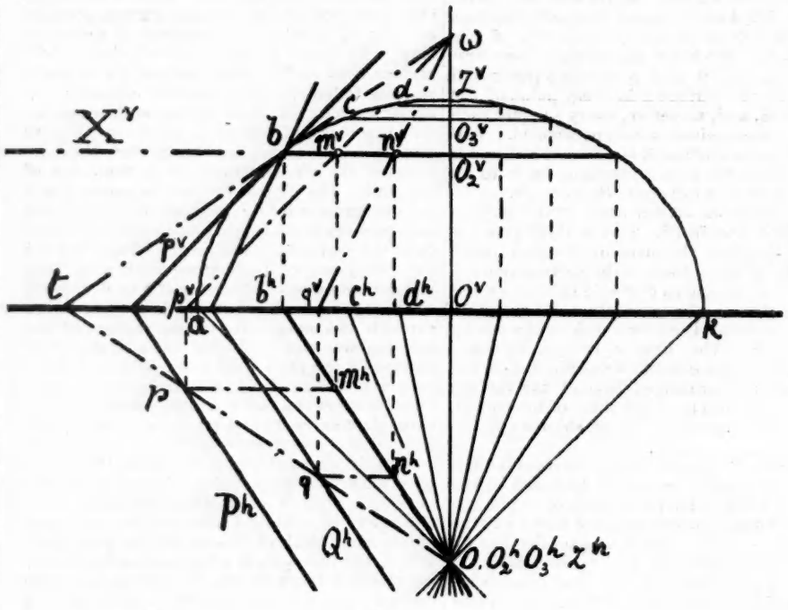


Fig. 233.

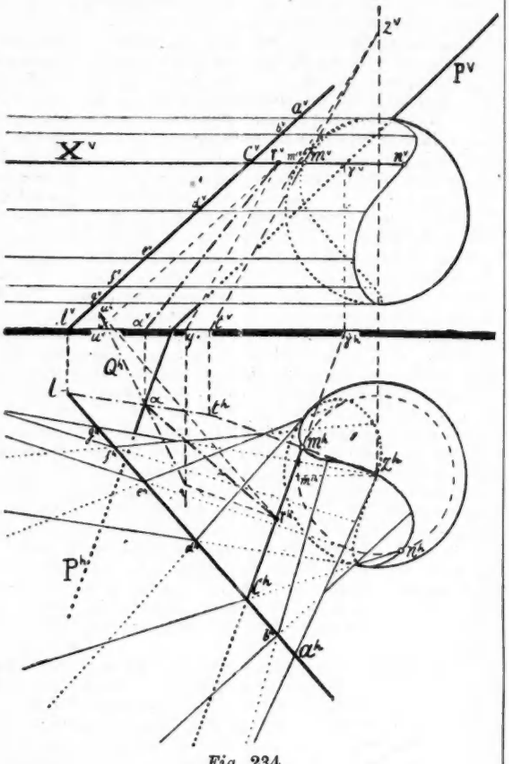


Fig. 234.

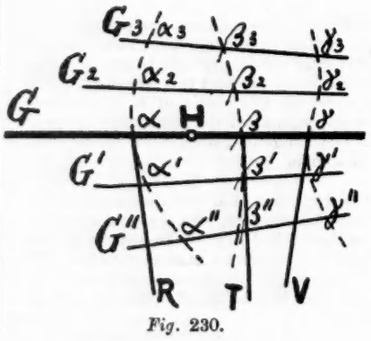


Fig. 230.

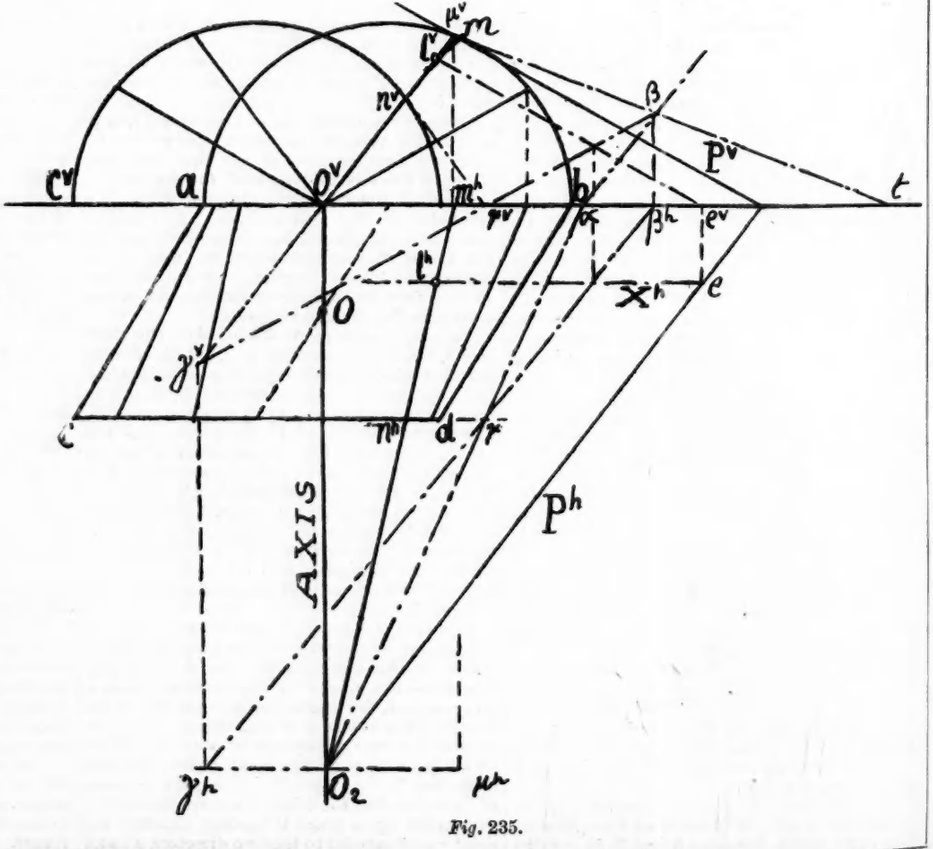


Fig. 235.

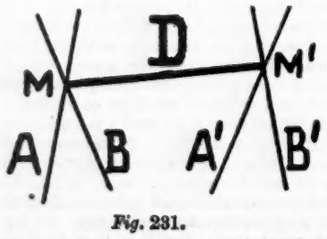


Fig. 231.

which *a* or *b* are the plans and a^1 or b^1 are the elevations of points. This is a system which prevents the demonstrator from speaking simply of the operations which take place in space without referring to their graphic representation. The method of notation we have employed is due to M. Cellérier, professor at the University of Geneva. Before concluding, we must warn the students against imitating the thick lines we have used in our drawings. Our drawings have been made solely for the purpose of demonstration, and to make them clearer we have varied the thickness of the lines according to their importance, in the hope that the thicker lines would at once catch the reader's eye and lead him more easily to find his way in the complicated maze of lines which such diagrams often present. Whatever may be thought of this innovation, we beg to say that we are solely responsible for this. In taking leave of our readers we hope that these papers will have brought the importance of this science clearly before the public, and that means will be found for fostering such studies more than has, unfortunately, been the case till now in England.

Books.

Inventions and how to Patent Them: a Practical Guide to Patentees. By T. EUSTACE SMITH, Barrister-at-Law. London: W. H. Kelly. 1886.

THIS is a clear and useful little handbook, which may be read with advantage, not only by those who desire to take out a patent, but by all who wish to acquire in a short space a knowledge of patent law. It is written primarily for those who wish to be their own patent agents, but it may be usefully perused by those who intend to make use of a patent agent, but who still desire to know something of the business which has to be done. There is no more to be said on such a work as this when we have indicated that it is clear and useful. It makes no pretence at anything more. There is one omission we notice,—that there is not a list of standard works on the subject of patents. Mr. Smith gives a list of towns and places which have complete sets of the Patent Office publications; he should have added such a list as we have mentioned. Again, on page 102, the author tells the reader that a collection of the patent laws and regulations of foreign States and of the British colonies can be inspected at the Free Public Library in the Patent Office, but he does not tell him that if he wishes to consult them in his own library he can do so by reading Messrs. Carpmael's work, "Patent Laws of the World," published by Messrs. Clowes & Sons. These are omissions of a kind which detract from the value of a work which is intended to be essentially helpful and practical.

VARIORUM.

MESSRS. CROSBY LOCKWOOD & CO. announce that Mr. Alexander Watt's new work on "Electro-Deposition," which is now nearly through the press, will be ready for publication in the early part of next month.——The next number of the *Antiquary* commences a new volume. It will open with an introductory article on the "History of the Crown Lands," by Mr. Hubert Hall. Among other articles contributed to the January issue will be one by Mr. Jewitt, on "Quaint Conceits in Pottery," by Mr. Clinch, giving a hitherto unpublished letter of Bishop Wainwright's; and a contribution to the history of old London from scarce tracts and satires.——The Christmas number of *Harper's Magazine* contains a well-illustrated article entitled "The Nativity in Art."——The *English Illustrated Magazine* for January contains an illustrated paper by Mr. H. D. Traill, entitled "A Month in Sicily." The illustrations include views of the interesting architectural remains of Girgenti, Taormina, and Syracuse. In the same magazine the Rev. Alfred Ainger discourses pleasantly of "Charles Lamb in Hertfordshire," and is ably seconded by the engraver.——The Christmas Number of the *Gardeners' Magazine* is varied and readable in its contents, and is accompanied by a sheet almanack for 1886, printed in colours.——*Illustrations* is the title of a threepenny monthly magazine, which, under the editorship of Mr. Francis George Heath, will commence in January. It is designed "to occupy a position not yet filled by any existing journal," and will be "a pictorial review of knowledge of all kinds, comprehending amusements, art, domestic economy, inventions, literature, and science." The publishers will be Messrs. Wells, Gardner, Darton, & Co.——Messrs. Cassell & Co., of La Belle Sauvage-yard, send us their admirable magazines for January. In the *Quiver*, "Two Famous London Churches,"—St. Margaret's, Westminster, and St. James's, Piccadilly,—form the subject of a paper by Mr. W. M. Adams. In *Cassell's Magazine* appears the second of Professor Stuart Blackie's papers on "London for Londoners." The Professor is pretty free in his criticisms of contemporary architecture. When he comes to speak of "Westminster Abbey and the Chapel adjacent," he says:—"This is, indeed, the great stone Iliad of England, to be ignorant of which should bring to a British schoolboy greater shame than not to have heard of the wrath of Achilles or the filial piety of the son of Anchises." *Little Folks*, Messrs. Cassell's magazine for the young, commences the first number of a new series, and appears in a new wrapper designed by Alice Havers.——From Messrs. Rider & Son, of 14, Bartholomew-close, we have received "The *Timber Trades' Journal* List of Telegraphic Addresses Registered by the Principal Firms in the Wood Trade," which will be very useful.——The *Leisure Hour* for December contains a readable paper entitled "Oxford Revisited," by Cuthbert Bede. There is also an illustrated paper on Nuremberg. The *Sunday-at-Home* for January contains an illustrated article on "Bartholomew's," in which the history of the church of St. Bartholomew-the-Great is discoursed of. The "Boys' Own Paper" for January begins a series of illustrated papers on "Our Great Public Schools," Winchester being the first treated of. The companion magazine, "The Girls' Own Paper," is publishing a series of articles on "Architecture; or, the Art and History of Buildings," by Mr. H. W. Brewer. The whole four of these excellent magazines are published at 56, Paternoster-row.

DIARIES AND ALMANACKS FOR 1886.

Messrs. Hudson & Kearns, of 83, Southwark-street, send us a parcel of their professional and general diaries, specially adapted to the requirements of architects, surveyors, engineers, builders, and contractors. No. 11, "The Builder's Diary," is specially ruled and arranged for the use of builders and contractors, and contains a great deal of useful information, such as wages tables, tables of scantlings, and other matter sure to be found handy on one's desk. No. 12, "The Architect's Diary," is specially arranged for the use of architects, surveyors, and civil engineers; while No. 13 is similar to No. 12, except that it is provided with two pages to a day instead of one page. We have frequently spoken of the great merits of these excellent diaries. No. 10 is a very good diary for general use. A speciality now introduced by this firm is their improved "Blotting-Pad Portfolio Diary," which possesses many advantages, especially fitting it for use when travelling. The same firm send us specimens of their date-indicating pads combined with diaries.

Messrs. T. J. & J. Smith, of 109, Queen Victoria-street, have sent us a large and varied assortment of their well-known and excellent productions. These diaries have now reached their fortieth year of issue,—a fact that of itself speaks well for them. For the pocket there are some small and cheap (though excellently got-up) varieties. Of these we may mention Nos. 17 and 29, which sell for 6d. each, and Nos. 1 and 15, which are to be had for 1s. each. Messrs. Smith's "Commercial Scribbling Diaries" are likely to maintain the favour with which they have long been received. Nos. 7 and 8 are useful though cheap varieties of the large or foolscap folio size; No. 9, with stiff covers, and with two days on each page, has the same-sized page, but is considerably thicker than Nos. 7 and 8. Of the smaller-sized scribbling diaries, Nos. 6 and 31 will be found very useful. The same firm's "Office-Desk Diary," No. 11, has three days to a page. Washing-books, housekeepers' books, &c., also figure in the list of Messrs. Smith's productions.

"The Railway Diary and Officials' Directory" for 1886 (published by McCorquodale & Co., Limited, of Cardington-street, Euston-square) has a title which is indicative of its contents. It is a very useful work of reference, containing as it does the weekly traffic returns for 1885, with blank columns for filling in those of 1886; four half-years' accounts of some of the principal companies; and a mass of other information pertaining to the railway service. From the same publishers we receive a copy of the "Railway Almanack,"—a useful sheet for the office-wall.

The "City Diary and Almanack" (twenty-third year of publication) is published by Messrs. W. H. & L. Collingridge, of the *City Press*, 148, Aldersgate-street. It is very well arranged and very creditably got up, and contains a mass of information about City men and City institutions, City churches and City guilds, not to be found in other diaries.

The "*Furniture Gazette* Diary and Desk-Book" (published by Messrs. Wyman & Sons, 75, Great Queen-street, W.C.) has now reached its tenth year of issue. Its contents include a classified directory of the furniture, upholstery, and decorative trades, and some useful business memoranda having especial reference to the requirements of those trades.

"Calvert's Mechanics' Almanack" for 1886 (London and Manchester: John Heywood) is a cheap and useful little miscellany, chiefly of value, apparently, to those engaged in the mechanical engineering trades.

"Jackson's Church of England Lectern and Parish Kalendar" for 1886 (published by J. Westell, 114, New Oxford-street) contains, amongst other miscellaneous matter, some useful hints on the care of churches and their furniture, &c.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

16,134, Ventilating Sewers. G. E. Eachus.

The sewer is divided into sections by flap-valves, each section being provided with an upcast and a downcast shaft, built in masonry, concrete, or similar substance. In the upcast, a filter and a silt-box are placed. To promote a draught, a descending stream of water may be used in the downcast, or a flame in the upcast. In some cases, for convenience, one shaft may be enclosed by the other.

15,525, Water-closet. F. R. Hapson.

The basin, which is of the wash-out type, is trapped by a web. The second trap is formed in the usual manner. To facilitate the emptying of the basin at each flush, the space between the seats is connected with an air-pipe to the flushing-pipe, at a point where it is provided with a short, loosely-fitting inner tube, to act as an injector, and exhaust the air from the space between the seats at each flush. A valve is introduced to prevent the return of the air, and the flushing cistern is provided with a poppet-valve operated in the usual way.

15,194, Joint for Lead Pipes. W. Gadd.

Two short tubes are placed inside and over the ends of the pipes. Molten metal is poured in through a hole left in the covering. The two tubes may be connected by a web in the middle. The tubes are heated before making the joint, or the molten metal is allowed to run out through another hole in the covering in order that the pipe ends may be fused and become one with the metal which has been run in.

15,800, Coating Vessels with Lead. I. S. McDougall.

Relates to coating vessels made with copper, or with copper alloys with lead. The vessel or part of it to be coated is treated with chloride of zinc (or its equivalent), then immersed in molten lead, or molten lead is run over the surface, or the lead may be applied in any suitable way.

15,932, Planing and Shaping Machines. W. H. Allday.

This invention is applied to planing-machines, and is used for forming circular concavities and convexities, especially for forming the pistons of rotary blowers, engines, &c. One half of the complete piston may be finished at one setting of the work, the concave and convex portions being formed at different parts of the stroke of the table.

NEW APPLICATIONS FOR PATENTS.

Dec. 11.—15,195, E. Coldwell, Apparatus for Burning off Old Paint.—15,214, J. Hancock, Ornamenting Surfaces in Representation of Inlaid Woods.—15,233, E. Emanuel, Self-closing Ball Valve.—15,235, W. Macrone, Apparatus for Checking the Time of Arrival of *employés*.—15,248, O. Elphick, Improvements in the Joints of Stoneware Pipes.

Dec. 12.—15,255, J. Shanks, Improvements in Water-closets.—15,269, G. Couch, Improvements in Fittings for Doors and Gates.—15,272, J. Davis, Appliances for Opening, Closing, and Fastening Windows, Fanlights, &c.—15,274, A. Elford, Device

for Flushing Sewers.—15,298, J. Baldwin, Door and other Bolts.

Dec. 14.—15,309, E. Horsley, Improvements in Window-fasteners.—15,317, B. Scott, Apparatus for Working the Valves of Water Cisterns.—15,326, B. Haigh, Apparatus for Disinfecting and Deodorising Closets, Urinals, &c.—15,327, A. Rickaby, Improvements in Slotting and Planing Machines.

Dec. 15.—15,364, E. Colton, Improvements in the Manufacture of Encaustic Tiles.—15,366, B. Pitt, Fire-grate with Flue and Draught-plate combined.—15,373, C. Miller, Window-fasteners.—15,404, P. Sorel, Improvements in Glazing.—15,406, J. Laybolt, Improvements in Saw Sets.

Dec. 16.—15,428, G. Chapman, Cement for the Manufacture of Furnace Bricks.—15,429, C. Clarke, Improvements in Socketed Pipe Joints.—15,464, E. Preston and E. De Russett, Improvements in Lavatories.—15,477, A. Wilkinson, New Method of Producing Ornamental Effects on Glass.

Dec. 17.—15,480, H. Grundy, Socket for Rain, Soil, or other Waste-water Pipes.—15,487, J. Chew, Sash-fastener.—15,506, T. Whitehead, Improvements in Chimney-tops, Ventilator Cowls, &c.—15,512, H. McGowan, Improvements in Screw-drivers, Gimlets, and similar Tools.—15,518, W. Robertson, Ornamental Woodwork.—15,519, H. Bonnycastle and T. Jones, Refractory and Non-conducting Bricks, Blocks, Tiles, Slabs, and Pipes.

PROVISIONAL SPECIFICATIONS ACCEPTED.

12,221, D. Allport, Arrangement for Lessening the Slamming of Doors, &c.—13,219, F. Moir, Improvements in Window Sashes for Ventilation Purposes.—13,256, P. Jahn, Planing Machines.—13,371, J. and W. Smith, Hanging and Supporting Sliding Window Sashes.—13,837, C. Day, Sash Fastener.—13,898, W. Vaughan and H. Gooch, Improvements in Locks and Latches.—13,945, J. Hill, Apparatus for Opening and Closing Fanlights and Casements.—14,029, J. Weber and W. Lennon, Counterbalancing Window Sashes.—14,254, W. Towler, Cisterns for Water-closets, Urinals, &c.—14,718, G. Thomas, Apparatus for Automatically Removing Water from Gas Pipes.—12,920, C. Howe, Manufacture of Keene's Cement.—13,110, W. Lake, Apparatus for Facilitating the Nailing of Laths.—13,849, J. Taylor, Improvements in Saws to Prevent Buckling.—13,896, Vaughan and Gooch, Attaching Door Knobs to Spindles.—13,923, H. Haddan, Improved Pipe Coupling.—13,934, W. Lake, Machine or Press for the Manufacture of Lead Pipe.—13,968, H. Thompson, Improvements in Grates and Stoves.—14,159, Johnston and Lockwood, Improvements in China or other Tiles.—14,374, E. Theedam, Chimney Tops.—14,500, Musselwhite and Prewett, Sash Line Socket.—14,521, W. Luther, Improvements in Astragals and Sash Bars.—14,619, T. and J. Fawcett, Machinery for Pressing Bricks, Brickettes, Tiles, &c.—14,672, G. Bonehill, Stair Nosings Treads, for Staircases, Floors, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

3,536, P. Nevill, Instrument for Measuring Angles.—8,375, W. Lane, Improved Chimneypot or Smoke Ventilator.—9,171, W. Walker and Others, Fluid-tight Joints for Pipes.—10,411, W. Bruce, Fixing Rain-water, Waste, and Soil Pipes.—11,998, G. Gray and Others, Improvements in Saws for Cutting Wood.—12,929, F. Dickinson, Brushes for Painting Woodwork, &c.—13,326, W. Whitwell and Others, Kilns or Chambers for Burning and Drying Bricks, &c.—13,526, W. & G. Barker, Construction of Open and Close Fire-grates and Stoves.—13,666, W. Alvorel, Knob Attachments.—1,961, W. Holt, Chimney Tops and Flues.—2,810, J. Watterworth, Ornamental Panel Work.—5,993, Ford & Archer, Improved Waterproof Material for Covering Roofs, &c.—8,578, J. Banks, Improvements in Door Checks.—13,233, T. Woods, Stonecutters' Tools.—13,670, 13,671, and 13,672, W. Alvord, Improvements in Knob Attachments.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

DEC. 14.

By REYNOLDS & EASON.

Widford, Herts—Four copyhold cottages and a plot of land	£130

By T. B. WESTACOTT.

Kentish Town—89 and 91, Harmood-street, copyhold	875
Hampstead-road—No. 96, term 23 years, ground-rent 8*l.* 8s.	380
Camden Town—4a, Kentish Town-road, 67 years, ground-rent 10*l.*	385
6, Kentish Town-road, 67 years, ground-rent 20*l.*	870
Manchester-square—81, East-street, and a ground-rent of 3*l.* 13s. 6d., two years, ground-rent 7*l.* 10s.	50

By WEATHERALL & GREEN.

Burghfield, Berks—A rent-charge of 43*l.* 15s. 2d. a year	1,095

DEC. 15.

By ALFRED RICHARDS.

Kentish Town—Improved ground-rents of 28*l.*, term 39 years	475
Improved ground-rents of 67*l.*, term 39 years	960

ABBEY, RUTTER, & WAGHORNE.

Berkeley-square—No. 53, with stabling, 12 years, ground-rent 30*l.*	3,500

By MURRELL & SCOBELL.

Brixton—38, St. James's-road, 37 years, ground-rent 10*l.* 10s	£850
Richmond, Friar's Stile-road—"Cornwall Lodge," freehold	1,660
Old Kent-road—1 to 20, Swan-place, freehold	3,700

By MULLETT, BOOKER, & Co.

Hyde Park—24, Oxford-terrace, 44 years, ground-rent 9*l.*	1,560

By DEBENHAM, TEWSON, & Co.

Ongar, near—Freehold land, 7a. 2r. 1p.	550
Regent-street—The lease of No. 164, term 18 years	1,220

DEC. 16.

By RICE BROS.

City—64, Bishopsgate-street Without, freehold	2,650

By P. MATTHEWS.

Clapton—Freehold ground-rents, 25*l.* 10s., reversion in 82 years	580

By COOPER & GOULDING.

Bermondsey—49, George-road, and 26, Bermondsey Wall, freehold	2,800

By D. SMITH, SON, & OAKLEY.

Whitechapel—Ground-rents of 30*l.* 8s., reversion in 10 years	1,455
Ground-rents of 9*l.* 15s., reversion in 14 years	695
9 to 15 odd, Philip-street, freehold	1,660
Marylebone—Ground-rents of 127*l.* 13s., term 14 years, with short reversions to rack-rents	1,157

DEC. 17.

By A. WALTON.

Norwood, Clifton Villas—Ground-rents 25*l.*, reversion in 76 years	560

By WOOD & SPINK.

Islington—48, Gibson-square, 41 years, ground-rent rent 6*l.* 10s.	590

By T. FORD.

Walworth—88 and 90, Penrose-street, 59 years, ground-rent 8*l.* 13s.	670
Old Kent-road—1 to 6, Hendre-road, 20 years, ground-rent 21*l.*	700

By NEWBON & HARDING.

Barnsbury—5 and 7, Albion-grove, three years, ground-rent 7*l.*	85
28, Albion-grove, 59 years, ground-rent 3*l.* 10s.	500
78, John-street, 59 years, ground-rent 4*l.* 4s.	410
15, Huntingdon-street, 64 years, ground-rent 8*l.*	590
2 and 3, Crescent-street, 63 years, ground-rent 14*l.*	830
King's-cross—28, 30, and 32, Wharfedale-road, 58 years, ground-rent 15*l.*	1,175
2 and 3, Railway-street, 58 years, ground-rent 10*l.*	575
Pentonville—10 and 11, Lloyd-square, 26 years, ground-rent 10*l.*	690

By A. G. OLLEY.

Marylebone—1 to 6, Upper Dorchester-place, 24 years, ground-rent 69*l.* 6s.	555
97 and 105, Boston-place, 24 years, ground-rent 25*l.* 4s.	150

By BALL, NORRIS, & HADLEY.

Shepherd's Bush—53, Adelaide-road, 78 years, ground-rent 7*l.* 7s.	150

By WALTON & LEE.

Hendon, Welsh Harp—A freehold plot of land, 1a. 1r. 8p.	900

DEC. 18.

By MCLACHLAN & SONS.

Clapham Common—The freehold residences, called "Springfield" and "Northside," containing 7¼ acres	16,000

MEETINGS.

WEDNESDAY, DECEMBER 30.

Civil and Mechanical Engineers' Society.—Mr. G. H. Blagrove, A.R.I.B.A., on "Viaducts." 7 p.m.

Builders' Foremen and Clerks of Works' Institution.—Annual Meeting of Directors. 8·30 p.m.

Archæological Section of the Birmingham and Midland Institute. 8 p.m.

Miscellanea.

Edinburgh Architectural Association.—On the 17th inst. a well-attended meeting of the Edinburgh Architectural Association was held in the Professional Hall, George-street,—Mr. Washington Browne in the chair,—when an interesting paper on "Foundations" was read by Mr. David M. Westland, C.E., who pointed out, in the first place, the necessity of equalising the pressure on the foundations of different portions of buildings which varied in height, and showed how this could be done so that the pressure per square foot in the foundation of a tower 250 ft. high need not be greater than that of a two-story building. He next gave examples of the safe weights which could be borne by foundations, and described the different methods adopted to obtain a stable foundation in soft or treacherous ground. In conclusion, as instances of large and difficult works of the kind, he gave some details of the foundations of the St. Louis Bridge on the Mississippi and the Brooklyn Bridge at New York, which, he stated, were of a far more gigantic character than even those of the Forth Bridge at Queensferry. A discussion followed. On the motion of Lord Dean of Guild Gowans, a vote of thanks was given to Mr. Westland for his paper.

Bow.—The Children's Home, Bonner-road, Bow, has just been presented with two Munich stained-glass windows, representing the figures of Faith and Hope. They have been designed and executed by Messrs. Mayer & Co.

Crystal Palace School of Engineering. On Saturday last, December 19th, the thirteenth year and thirty-ninth term of this school closed in the usual manner by the presentation of the certificates awarded to the students by the examiners. The chairman on this occasion was Sir F. A. Abel, F.R.S.; the examiners were Messrs. S. C. Homersham and G. G. André. From statements made at the meeting we learn that the school commenced with nine students, now increased to nearly ninety,—eighty-nine being the number in the term preceding the one just closed. The last student entered was the six-hundredth that has entered the school. Students who have passed through the school are now filling important posts as engineers or otherwise in all parts of the world. The lecture examination for the term was on "Materials and their Manufacture." Forty-eight students had attended these lectures; forty-three were eligible for examination, and twenty-six passed with from 241 to 108 marks; the highest number of marks attainable was 273. Three students,—W. Bosman, J. F. Harrison, and F. Stewart,—had each 241 marks; Bosman was also one of the three first for work in the drawing-office; the other two being E. R. Dangerfield and F. B. Dixon. For work in the pattern-shop R. P. Verral was first in order of merit; and J. F. Harrison (mentioned above) first in the fitting-shop. The firsts in the second year's course,—civil engineering,—were:—first term, M. Mawson; second term, E. H. B. Claydon; third term, E. H. Stillgoe. Five certificates were also awarded to students in the Colonial Section. An interesting and thoroughly-practical address was delivered to the students by the Chairman, who said that he had long desired an opportunity of examining the school, its course of instruction and training, and the work done in it; and he was happy to say that the knowledge he had acquired concerning its character and results had highly gratified him, and even exceeded his expectations, high although these had been.

Metropolitan Sewage Disposal.—The Metropolitan Board of Works are proposing to expend a further sum in respect of deodorisation works for the treatment of sewage, and are evidently hoping that the sludge will be used by farmers, and that the Board will be saved the expense of carrying it out to sea. Dr. Voelcker's opinion is said to have led to this hope, and it would undoubtedly be a great boon to the metropolis if its refuse should be a source of profit; but the project is not very encouraging. It is believed that of seventeen shillings per one hundred tons given as the theoretical value of town sewage, only two shillings lay in the suspended matter, and hence, as the recent Royal Commission has pointed out, the precipitated solids could, at the best, represent only about one-eighth of the value of the original sewage. London will not, however, begrudge the expenditure of money if its river can be freed from pollution. This is the first consideration, and is an absolute necessity; and it is better not to dwell too much upon profit, which must, at the best, be of a very doubtful character.—*Lancet.*

American Elevators.—The American Elevator Company have just been awarded the contract for two additional elevators to be erected in the Warnford-court Buildings, Throgmorton-street, opposite the Stock Exchange. This building was equipped with one of the Standard hydraulic elevators about a year ago, and the two others above referred to are for the new part which is just reaching completion. It is intended to have a typical American lift service in this building, and no expense is being spared to effect this. All three lifts take their supply from the same tank on the roof, and discharge into another tank in the basement. The water is pumped back again by a Worthington compound pump, and thus the cost of working all three lifts is the cost of pumping. It is claimed that this will be the most efficient and the most economical lift service in London.

The Influence of Weather upon Sandstone.—Protracted observations bearing upon the above subject have been made by Julius Stocklasa, who (according to the *Chemiker Zeitung*) divides the process into four stages. The first is the oxydation of the ferro-combinations (which causes the stone to become yellow); the second is the lixiviaton of the carbonates; the third is the gradual disappearance of half the entire proportion of carbonate of calcium and the regular increase of silicates and sand; while the fourth is the decomposition of the mass.

Royal School of Mines.—Prof. Warington Smyth, F.R.S., in continuing his lectures in the theatre of the Geological Museum, Jermyn-street, spoke of the operations of "costeaning," or "prospecting," as being sources of considerable expenditure of capital, often without return, and especially of the display of great ignorance in regard to the particular class of rock in which they should be carried out. The first difficulty in the way of these particular methods of search for a lode is the presence of surface material in the form of sand, gravel, vegetable matter, and vegetation. Search operations are necessarily dependent, therefore, to a large extent, upon observations made upon a small portion of ground, which shall be applicable to very large areas. It results from these conditions that a large proportion of those mines which could be pointed out as notable ones have been discovered by accident, *e.g.* one lode in the neighbourhood of Tavistock was discovered by some boys out fishing, who found the gossan of a copper lode, with a small quantity of ore in it; the Plynlimmon Mine, on the flanks of the mountain of that name, was similarly discovered by some men while fishing; pellets picked up by game birds had led to the discovery of gold in Lower Hungary; and in Australia ducks and geese, having picked up grains of gold from the beds of the streams, had directed attention to profitable situations. The famous silver mines of Potosi were discovered by an Indian, who, taking hold of a bush to prevent his falling, pulled it up by the roots, and thereby disclosed some masses of native silver. The copper mines of Wallaroo, in South Australia, recently brought into prominence, were discovered by observing some green copper in the material thrown out by a little burrowing animal,—the wombat. Finally, a discovery of gold by Col. Sutter, a Swiss emigrant, while cutting a small water-course in California, has led to momentous results in so far as it gave rise, not only to a "rush" to that particular district, but also to numberless search operations for similar deposits in South America, Australia, and other parts of the world.

The New Bridge at the Tower.—At the meeting of the Court of Common Council on Thursday, Dec. 17, an agreement was sealed in triplicate between the Corporation of London, Mr. Horace Jones (City Architect), and Mr. J. Wolfe Barry, C.E., for the superintendence and erection of the new Tower Bridge, which the Corporation are empowered to construct under the Act of Parliament to which the royal assent was given on August 14 last. That agreement, which was prepared by the Comptroller and Remembrancer, and settled by counsel and approved by Mr. Horace Jones and Mr. Barry, carries into effect a report of the Bridge House Estates Committee, adopted by the Court of Common Council on October 8. After giving the matter their careful consideration, the committee agreed that the sum of 30,000*l.* should be paid to the City Architect and Mr. Barry, in such proportion as they might mutually agree upon, for superintending the erection and construction of the bridge, such sum to include the salaries and expenses of all superintendents and clerks of the works. The total cost of the bridge is estimated at 610,000*l.*

The Runic Monument at Ruthwell.—It is proposed to shelter the runic monument at Ruthwell, near Annan, from the weather,—which is gradually effacing its interesting legends, especially the more lightly-chiselled runes,—in a building adjoining the parish church, in which it formerly stood. The cost of the building is estimated at about 250*l.*, towards which the Earl of Mansfield has given 25*l.*, and other donations have been promised. This is a laudable project; but why should the minister of Ruthwell call it the "proposed restoration of the runic monument?" *Dii omen avertant.*—*Athenæum.*

Sanitary Reforms at Naples.—According to the *Chemiker Zeitung*, serious measures have at length been taken for the improvement of the sanitary condition of Naples. It had been found that no fewer than 2,182 wells had to be closed on account of their containing foreign substances of a more or less dangerous character. On account of scarcity of water forty-four habitations had to be closed in the Santo Giuseppe district, and fifty-six in Monte Calvario. If the orders now given be not modified, there will have been removed within a short time 3,175 unhealthy dwellings, and 2,882 polluted wells in Naples alone.

York.—The *York Herald* describes the new Probate Registry and Wills Offices, which are being erected in York by the Government on a site in Duncombe-place. The style of architecture is Early English. The materials used are Bradford wall stone, with Stainton stone dressings, lined with brick. The building is being erected from plans prepared by Mr. Tanner, Surveyor to the Office of Works. The clerk of works is Mr. Patterson. The contractors for the erection of the building are Messrs. Bull, Sons, & Co., of Southampton.

The Glyptothek at Munich.—According to the *Berliner Börsen Courier* the King of Bavaria has intimated his intention to sell the "Glyptothek" (the Museum of Sculpture), at Munich, the value of which is estimated at no less than 25,000,000 marks, or 1,250,000*l.* sterling.

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	6	10	0	7	10	0
Teak, E.I. ....load	12	10	0	15	10	0
Sequoia, U.S. ....ft. cube	0	2	6	0	2	9
Ash, Canada ....load	3	0	0	5	0	0
Birch ,, ...	3	0	0	4	10	0
Elm ,, ...	3	10	0	5	0	0
Fir, Dantsic, &c.	1	10	0	4	10	0
Oak ,, ...	3	0	0	5	0	0
Canada	6	0	0	7	0	0
Pine, Canada red	3	0	0	4	0	0
,, yellow	3	15	0	5	5	0
Lath, Dantsic ....fathom	4	10	0	6	0	0
St. Petersburg	5	0	0	7	0	0
Wainscot, Riga....log	2	15	0	4	10	0
,, Odessa	3	12	6	3	15	0
Deals, Finland, 2nd and 1st...std. 100	7	10	0	8	10	0
,, 4th and 3rd	6	0	0	7	10	0
Riga	6	0	0	8	0	0
St. Petersburg, 1st yel.	9	0	0	15	0	0
,, 2nd ,, ...	7	0	0	8	15	0
,, white	8	0	0	10	10	0
Swedish	6	0	0	15	10	0
White Sea	8	0	0	18	0	0
Canada, Pine 1st	17	0	0	31	10	0
,, 2nd	13	0	0	17	10	0
,, 3rd, &c.	7	0	0	10	0	0
,, Spruce 1st	9	0	0	12	0	0
,, 3rd and 2nd	6	0	0	8	0	0
New Brunswick, &c....	5	0	0	7	0	0
Battens, all kinds	4	0	0	12	0	0
Flooring Boards, sq. 1 in.—Prepared, first	0	9	0	0	13	0
Second	0	7	6	0	8	6
Other qualities	0	5	0	0	7	0

TIMBER (*continued*).	£.	s.	d.	£.	s.	d.
Cedar, Cuba....foot	0	0	3½	0	0	4
Honduras, &c.	0	0	3	0	0	4
Australian	0	0	3	0	0	3½
Mahogany, Cuba	0	0	5	0	0	7½
St. Domingo cargo av.	0	0	5½	0	0	7½
Mexican ,, ...	0	0	4	0	0	5
Tobasco cargo av.	0	0	4	0	0	6½
Honduras cargo av.	0	0	4½	0	0	6½
Maple, Bird'seye	0	0	3½	0	0	6
Rose, Rio ....ton	7	0	0	16	0	0
Bahia....	8	0	0	14	0	0
Box, Turkey	5	0	0	18	0	0
Satin, St. Domingo .... ft.	0	0	0	0	0	0
Porto Rico	0	0	0	0	0	0
Walnut, Italian	0	0	4	0	0	5
METALS.						
IRON—Pig in Scotland ....ton	2	2	6	0	0	0
Bar, Welsh, in London....	4	15	0	5	0	0
,, ,, in Wales	4	7	6	4	10	0
,, Staffordshire, London	5	15	0	7	0	0
Sheets, single, in London....	7	10	0	9	0	0
Hoops ,, ...	6	5	0	7	5	0
Nail-rods ,, ...	5	15	0	7	0	0
COPPER—						
British, cke. and ingt. ....ton	44	0	0	45	0	0
Best selected	45	0	0	46	0	0
Sheets, strong....	0	0	0	0	0	0
,, India	48	0	0	48	10	0
Australian, fine cash....	0	0	0	0	0	0
Chili, bars ,, ...	41	2	6	41	10	0
YELLOW METAL....lb.	0	0	4½	0	0	4½
LEAD—Pig, Spanish	12	2	6	12	5	0
English, com. brands	12	12	6	0	0	0
SPELTER—						
Silesian, special ....ton	15	2	6	15	7	6
Ordinary brands	14	17	6	15	0	0
TIN—						
Banca	96	0	0	0	0	0
Billiton	94	0	0	0	0	0
Straits	93	15	0	93	5	0
Australian	93	15	0	93	5	0
English ingots....	97	0	0	0	0	0
ZINC—						
English sheet	0	0	0	0	10	0
OILS.						
Linseed ....ton	20	0	0	20	10	0
Cocoanut, Cochin	30	0	0	0	0	0
Ceylon	28	10	0	0	0	0
Copra....	0	0	0	0	0	0
Palm, Lagos	29	10	0	0	0	0
Palm-nut Kernel	25	0	0	25	10	0
Rapeseed, English pale....	23	10	0	0	0	0
,, brown	21	15	0	0	0	0
Cottonseed, refined	18	0	0	20	0	0
Tallow and Oleine	25	0	0	40	0	0
Lubricating, U.S.	7	0	0	10	0	0
,, Refined	4	0	0	10	0	0
TURPENTINE—						
American, in cks. ....cwt.	1	6	9	1	7	0
TAR—Stockholm ....brl.	0	18	6	0	19	0
Archangel....	0	11	6	0	12	0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Construction of Vessel for Sewage	Met. Board of Works	500*l.* (if not accepted)	Jan. 28th	ii.
New Wing to Buildings	East London Hospital...	Not stated	March 1st	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Brick and Pipe Sewer	Lowestoft Town Council	R. H. Inch....	Jan. 4th	ii.
Sewerage Works....	Besumaris Corporation	Shone & Ault	do.	ii.
Roads and Sewers	Com. of H.M. Works...	*Official*	do.	ii.
Collection, &c., of Dust	Wandsworth Bd. of Wks	do.	Jan. 5th	ii.
Concrete and other Sewers	Ramsgate Town Council	W. C. Barley....	do.	ii.
Additions to Police Station, Worthing	W. Sussex Constabulary	Ellice Clark	Jan. 6th	xviii.
Brick Sewer	Tottenham Local Board	— De Pape	Jan. 12th	ii.
Works and Materials	Parish of St. Marylebne	*Official*	Jan. 14th	ii.
Breeze, Ashes, and Dusting	do.	do.	do.	ii.
Carting Slops and Sweepings....	do.	do.	do.	ii.
Watering Streets and Roads	do.	do.	do.	ii.
Broken Stone, Footway Kerb, and Yorkshire and other Footway Paving	do.	do.	do.	ii.
Passenger Station	Lon. & N. W. Ry. Co.	S. B. Worthington	Jan. 19th	ii.
Boundary-Walls, Abutments, &c., for Bridge	Colne and Marsden L. B.	H. Bancroft	Feb. 2nd	ii.
Ironwork for Bridge....	do.	do.	do.	ii.
Cast-Iron Mains, &c., for Water-Supply	City of Bombay	*Official*	March 16th	ii.
New Stabling, Lodge, &c.	London and Suburban Sanitry Survey Assoc.	Ed. Tidman	At once	xviii.
Extension of a Pier at Greenhithe....	....	Parr, Strong, & Parr ...	Not stated	xviii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Assistant Surveyors	Civil Service Com.	Not stated	Jan. 5th	xvi.
Building Inspector	Willesden Local Board	2*l.* 10s. per week ...	do.	xvi.

TENDERS.

BATTERSEA.—For caretaker's house, &c., at Winstanley-road School, Battersea, for the School Board for London. Mr. T. J. Bailey, architect:—

C. Wall	£516 0 0
Lathey Bros....	493 0 0
Hobson & Co.	488 0 0
Rice	415 0 0
Holloway Bros.	414 0 0
W. Johnson	403 0 0

BATTERSEA.—For caretaker's house, &c., at Newroad School, Battersea, for the School Board for London. Mr. T. J. Bailey, architect:—

W. H. Castle....	£1,076 0 0
Hobson & Co.	1,048 0 0
H. Mallett...	970 0 0
Atherton & Latta	963 0 0
Nightingale	952 0 0
Lathey Bros.	947 0 0
Holloway Bros....	897 0 0

FINSBURY.—For additions and alterations to Paul-street, Finsbury, for the Royal London Friendly Society. Mr. H. H. Collins, architect, Old Broad-street, E.C. Quantities supplied by Messrs. Batstone Bros., Cannon-street :—

	Building.	Fittings.	Total.
Trent Bros.	—	£1,799 0	—
Colls	£3,474	1,420 0	£4 894
Ashby & Horner	3,445	1,387 0	4,832
Shurmur	3,399	1,398 0	4,797
Sage	—	1,343 14	—
Outhwaite	3,420	1,340 0	4,760
Downs	3,320	1,366 0	4,686
Boyce	3,310	1,294 0	4,604
Drew & Cadman	—	1,240 0	—
Emery	—	1,234 0	—
Kirk & Randall	3,400	1,130 0	4,530
Croaker	3,168	1,278 0	4,446
Sparks	3,300	1,150 0	4,400
Laurence	3,185	1,194 0	4,397
Nightingale	3,069	1,300 0	4,367
Hunt	3,005	1,180 0	4,185
Mark Gentry	2,945	1,125 0	4,072
Lascelles*	2,361	1,041 0	3,900

* Accepted for the whole.

HAMPSTEAD.—For gardener's cottage and lodge, Wells Charity Estate, Hampstead. Mr. H. S. Legg, architect :—

Burford, Hampstead	£593 0 0
Hackworth, Hampstead	585 0 0
Watts, Hampstead	559 0 0
Gould & Brand, Camden Town	549 0 0
Butcher	539 0 0

LONDON.—For the erection of Mission Hall, Hart's-lane, Bethnal-green-road, for the Bedford Institute Committee. Mr. Edward Saunders, architect. Quantities by Mr. H. W. Dobbs :—

		Alternative Price.
Serjeant	£4,998	£4,924
Dove Bros.	4,795	4,750
Adams	4,779	4,691
Brass & Sons	4,587	4,482
Woodward	4,499	4,427
J. Higgs, Upper Park-place, Dorset-square (accepted)	4,337	4,267

LONDON.—For engineering and constructional iron-work in new warehouses to be erected on the site of the East London Aquarium, Bishopsgate. Messrs. Gordon & Lowther, architects :—

Marshall & Hatch (accepted)	£1,050 17 0

NORBITON.—For the erection of additional stabling for thirty-six horses, at Messrs. Carter, Paterson, & Co.'s depôt, Manor Gate-road, under the superintendence of Mr. Wm. Eve, Union-court, Old Broad-street, E.C. :—

Higgs, Station Works, Loughborough Junction.
[Accepted on a schedule of prices.]

ROTHERHITHE.—For the erection of St. Bartholomew's Church. Mr. W. T. Allen, architect, Southampton-street, Strand. Quantities by Mr. F. W. Davis :—

Higgs & Hill	£10,525 0 0
Wm. Downs	10,328 0 0
Perry & Co.	10,221 0 0
Nightingale	1,143 0 0
Lawrance & Sons	9,821 0 0
Jas. Morter	9,597 0 0
Stephens & Bastow	9,3 0 0 0

STOKE NEWINGTON.—For the erection of additional hospital stabling for thirty-one horses, and Turkish bath, for Messrs. Carter, Paterson, & Co., under the superintendence of Mr. William Eve, Union-court, Old Broad-street, E.C. :—

Exton	£3,158 0 0
Adamson & Son	2,810 0 0
Brass & Son	2,793 0 0
Lawrance	2,728 0 0
Godfrey & Son	2,666 0 0
Perry & Co.	2,539 0 0
Morter	2,520 0 0
Downs	2,494 0 0
Harris & Wardrop	2,467 0 0
Holland, 163, Brunswick-street*	2,433 0 0

* Accepted.

WESTMINSTER.—For alterations, &c., to Baptist Chapel, Romney-street, Westminster. Mr. Vincent C. Brown, architect :—

		Time. Weeks.
Warne & Sons	£695	6
Stephens & Bastow	659	7
Haward Bros.	619	8
Brown	585	13
Holliday & Greenwood	515	9
W. Johnson	495	10
Holloway Bros. (accepted)	487	8

YARMOUTH.—For re-seating and other works at the Wesleyan Chapel, Great Yarmouth. Mr. W. B. Cockrill, Gorleston, architect :—

		Gallery extra.
Leggett	£1,576 0	£646 0
Leach, Lynn	793 0	—
Cooper	777 10	331 10
Bray	702 0	211 0
Bly	750 0	187 0
Bedwell, Lowestoft	690 10	172 10

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., *not later than Four p.m.* on THURSDAYS.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

"Faith" (we cannot print letters without authentication by the writer's name; not necessarily for publication, of course).—"Each Bird," &c. (ditto).—J. O'C. (the designs of that school are well known; our object was to illustrate a school of artists not so generally known).—H. A. A. (appeared in our last).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

The "NEW YEAR'S NUMBER" will be published on FRIDAY, the 1st of JANUARY next, Price 4d. Advertisements for this special issue should be sent to the Office as early as possible.

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PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps *must not* be sent, but all small sums should be remitted by Cash in Registered Letter or by Money Order, payable at the Post-office, Covent-garden, W.C. to
DOUGLAS FOURDRINIER, Publisher,
Addressed to No. 46, Catherine-street, W.C.

Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

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